Q
1
.V82
v.10
no.2

UNIVERSITY
OF MICHIGAN
APR 23 1959
LIBRARY

# THE VIRGINIA JOURNAL OF SCIENCE

A JOURNAL ISSUED QUARTERLY BY THE
VIRGINIA ACADEMY OF SCIENCE

Vol. 10, New Series | April, 1959 | No. 2

VOL. 10, NEW SERIES April, 1959 No. 2

THE VIRGINIA JOURNAL OF SCIENCE

PUBLISHED FOUR TIMES A YEAR IN JANUARY, APRIL, JULY, AND SEPTEMBER, BY THE VIRGINIA ACADEMY OF SCIENCE

Printed by *The Bassett Printing Corporation*, Bassett, Virginia

## CONTENTS

*Pages*

Characters Differentiating Common Morning-Glories Occurring in Virginia — Robert J. Knight, III ..... 63

A Study of The Chlorophyta of the James River Basin, Virginia — Bernard Woodson, Jr. ..... 70

News and Notes ..... 83

Program of the Thirty-Seventh Annual Meeting of the Virginia Academy of Science ..... 101

EDITORIAL BOARD

ROBERT T. BRUMFIELD, *Editor*
MARY E. HUMPHREYS, *Associate Editor*
CHARLES F. LANE, *Managing Editor*
LEE S. HARROW, *Advertising Manager*

SECTION EDITORS

| | | |
|---|---|---|
| Carl W. Allen | Irving G. Foster | P. Arne Hansen |
| Walter S. Flory, Jr. | Merle A. Kise | James P. Patton |
| Robert M. Hubbard | Bruce W. Nelson | W. Parker Anslow, Jr. |
| Cyril R. Mill | Caroline Gambrill | C. Y. Kramer |

*Entered as second-class matter, at the post office at Bassett, Virginia, and Farmville, Virginia, under the Act of March 3, 1897. Subscription $3.00 per volume. Published four times a year: in January, April, July, and September, by the Virginia Academy of Science at Farmville, Va.*

Mailed April 6, 1959

THE VIRGINIA
JOURNAL OF SCIENCE

VOL. 10, NEW SERIES APRIL, 1959 No. 2

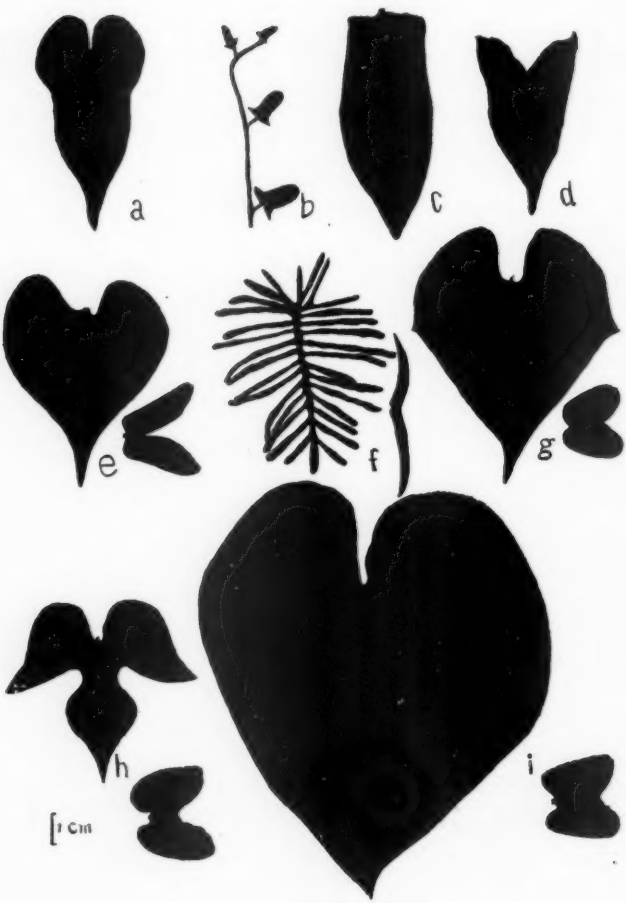
# CHARACTERS DIFFERENTIATING COMMON MORNING-GLORIES OCCURRING IN VIRGINIA[1]

ROBERT J. KNIGHT, III[2]
*The Blandy Experimental Farm, Boyce, Virginia*

A few species in the Convolvulaceae are numerically abundant in Virginia. These morning-glories and bindweeds are in greatest evidence as seedlings or blooming and maturing plants during the warm months of the year. During the course of a study of evolutionary trends in the family, a key was prepared for diagnosing the taxa most common in northern Virginia. It is believed that this may be of use in determining the identity of specimens encountered in the field in most parts of the State. An artificial key is used rather than one based on putative phylogenetic relations, because this method appears to the author to be the simplest procedure for rapidly determining identities of living specimens. If the treatment common in Europe were followed (Van Ooststroom, 1938; Hallier, 1893), three species discussed here would be placed in *Calystegia* which is not usually given generic standing in North America (Fernald, 1950; Lawrence, 1951; Gleason, 1952). These species are listed here as *Convolvulus sepium, C. spithamaeus* and *C. Purshianus* Wherry. There seems to be some justification for the European practice when one considers the relative size and position of bracts, and volume of pollen grain in relation to length of style in these three species. Nevertheless at present and pending additional taxonomic studies of the group, it is believed advisable to follow the usual American procedure and retain them within the genus *Convolvulus*.

[1] The author gratefully acknowledges the counsel and support of Dr. W. S. Flory, Jr., who directed his graduate research at The Blandy Experimental Farm. This paper is a portion of a dissertation submitted to the University of Virginia in partial fulfillment of requirements for the Ph.D. degree.

[2] Present address: U.S.D.A. Agricultural Research Service, Crops Research Division, Beltsville, Maryland.


a
b
c
d
e
f
g
h
i
[1 cm

In southern Virginia near the coast one might occasionally encounter the cypress-vine, *Quamoclit pennata* (Desr.) Voigt. The cypress-vine itself is not included in the present key because of its comparative rarity when the entire State is considered. This species is unmistakably identified by its finely-divided pinnate leaves (fig. 1 f, leaf-blade and cotyledon) and the dark red, star-shaped flowers. White flowers are also known.

On shale formations in western Virginia and West Virginia, *Convolvulus Purshianus* Wherry (*Calystegia tomentosa* Pursh) occurs. This species is readily recognized by the dense silvery tomentum on the leaves. The leaves remain folded together for much of their length, and this makes them appear wilted even when moisture relations are normal.

The annual versus perennial growth habit can be determined by following a given shoot into the soil. In annual species, the cotyledons persist until the plant is quite large; even though the cotyledons may have fallen they leave two prominent, oppositely-oriented scars near the soil line. The true leaves are alternately arranged in morning-glories, and therefore leave no scars directly opposite each other upon falling. Thus a Convolvulaceous plant without visible cotyledons or their scars is immediately classed as perennial.

The habit of promiscuous rooting from widely proliferating underground rhizomes affords a useful means of distinguishing *Convolvulus* from the only perennial *Ipomoea* occurring throughout Virginia, *I. pandurata*. The large fleshy taproot of this species may terminate as much as 30 to 40 centimeters below the soil's surface. Though several shoots may arise from a given root, they can all be traced back to a common point of origin. These shoots are true stems, bearing nodes below ground. They produce no roots above the point of attachment to the taproot.

Within the annual species, the only problem of identification likely to be encountered is that of differentiating *Ipomoea purpurea* from *I. hederacea*. It is believed that the accompanying key and the descriptive

---

Figure 1. Outlines of leaf-blades of nine, and cotyledons of five morning-glory species occurring in Virginia: a. leaf-blade of *Ipomoea pandurata;* b. shoot of *Convolvulus arvensis,* bearing 4 leaves; c. leaf-blade of *Convolvulus spithamaea;* d. leaf-blade of *C. sepium;* e. leaf-blade and cotyledon of *Ipomoea lacunosa;* f. leaf-blade and cotyledon of *Quamoclit pennata;* g. leaf-blade and cotyledon of *Q. coccinea;* h. leaf-blade and cotyledon of *Ipomoea hederacea;* i. leaf-blade and cotyledon of *I. purpurea.*

information immediately following it will make this problem less difficult.

## A KEY TO THE MORNING-GLORIES COMMON IN VIRGINIA

A. Perennial

B. Individual plants arising from single large fleshy taproot, rarely spreading by underground rhizomes ..... *Ipomoea pandurata.*

B. Individual clones spreading widely by means of underground rhizomes; roots finely divided, no single large taproot ..... C

C. Bracts small, inconspicuous, well below the calyx ..... *Convolvulus arvensis*

C. Bracts large, enveloping sepals and later capsule as it develops ..... D

D. Erect habit of growth, producing many short stems ..... *C. spithamaeus.*

D. Twining habit of growth ..... *C. sepium.*

A. Annual

B. Flowers orange or scarlet, salverform with exserted pistil and stamens; sepals tapering into long, spurlike projections ..... *Quamoclit coccinea.*

B. Flowers not orange or scarlet, funnelform with included pistil and stamens; calyx without spurlike projections ..... C

C. Flowers small (1.5 to 2 cm. long by 1 to 2 cm. in diameter), white or pale purple, ovary 2-celled ..... *Ipomoea lacunosa.*

C. Flowers larger than above (tube 2.5 cm. or longer, limb 3.0 cm. or more in diameter), blue, purple, red or white; ovary 3-celled ..... D

D. Flowers blue, never with 5 dark lines in throat, relatively small (tube 2.5 to 5.0 cm., limb 2.5 to 4.0 cm.), leaves usually 3-lobed; ripened ovary never depressed *I. hederacea.*

D. Flowers purple, red, blue, or white, almost always with 5 dark lines in throat, relatively large (tube 4.0 to 6.0 cm., limb approximately the same); leaves usually entire, not lobed; ripened ovary almost always depressed *I. purpurea.*

1. *Ipomoea pandurata* (L.) G. F. W. Meyer. Leaves cordate to panduriform, glabrous or finely pubescent, with conspicuous dark vein-

ing; stems uniformly dark brown to purple; calyx glabrous, fleshy, adhering closely to base of flower; corolla funnel-shaped, tube from 5 to 8 cm. long, limb of approximately the same width, white; interior of tube maroon; stigma 2-parted; often fails to set seed, thus late in season may exhibit many barren peduncles from which flowers have fallen. Occurs in cultivated fields, along roadsides, in power company rights-of-way and other cleared areas. Blooms in Clarke County from earliest summer to frost. Leaf-blade outline (fig. 1 a).

2. *Convolvulus arvensis* L. Corolla bell-shaped, small (1.5 to 2.0 cm. long by about same width), white or sometimes pinkish; plant finely pubescent or glabrous, having small, rounded-triangular to conspicuously sagittate leaves, from 2 to 5 cm. long by 2 to 3.5 cm. wide; leaves vary much in shape and size from one clone to another (Brown, 1946); plant generally fine in scale, of a dark grayish-green color. A frequent pest in lawns and gardens, common in moist soil along roadsides and ditchbanks. Blooms, moisture supply permitting, from early summer to frost. Individual clones, isolated, set few if any seed. Outline of shoot with leaves (fig. 1 b).

3. *Convolvulus spithamaeus* L. Leaves oblong or slightly narrower at base than middle, pubescent; corolla large, white or pinkish, bell-shaped (4 to 7 cm. long by about same width). Common along Skyline Drive in mid-June. Leaf-blade outline (fig. 1 c). [Closely related to this species, if not a form of it, is *Convolvulus Purshianus* Wherry (*Calystegia tomentosa* Pursh), with persistently conduplicate leaves bearing a thick, silvery pubescence; an inhabitant of shale areas in western Virginia.]

4. *Convolvulus sepium* L. Entire plant glabrous, of a bright green color; peduncles rectangular in cross-section; leaves large (5 to 10 cm. long by 3 to 7.5 cm. wide), usually triangular or saggittate, with one or two sharply defined angles at the base; veins depressed, giving leaves a reticulate appearance; flowers large (4 to 7 cm. long by about same width), white or pink. Abundant in old cornfields or other areas long in cultivation, often occurring along fencerows. Blooms in Clarke County from the third week in June until frost. Leaf-blade outline (fig. 1 d).

5. *Quamoclit coccinea* (L.) Moench. Readily determined from color of corolla and, after blooms have faded, by the long spurlike awns which terminate the sepals; ripening and mature ovary depressed; leaves usually cordate, entire or very shallowly trilobed, but in form *hederifolia* House are deeply 3- to 5-lobed. Immature plants can be distinguished from species of *Ipomoea* which might be present by the lighter green, almost yellowish cast of the *Quamoclit* plants, in contrast to the darker green color characteristic of *Ipomoea* seedlings. *Quamoclit coccinea* is oc-

casional in cultivated fields. Blooms in Clarke County from mid-August until frost. Outline of leaf-blade and cotyledon (fig. 1 g).

6. *Ipomoea lacunosa* L. Flowers inconspicuous, closing early in day, often hidden in foliage; corolla most often white, but may be a pale purple; leaves most often entire, not lobed, but may be shallowly 3-lobed or, rarely, 5-lobed; cotyledons deeply divided, with narrow lobes which flare widely; sepals thin but tough and rigid as opposed to soft, herbaceous calyx of other annual species of *Ipomoea*. Blooms from late June to October at Blandy Farm. Only white flowers have been observed in Clarke and Warren Counties, but the mauve-colored forma *purpurata* Fernald has been collected in Albemarle County. Outline of leaf-blade and cotyledon (fig. 1 e ).

7. *Ipomoea hederacea* (L.) Jacquin. Leaves usually 3-lobed in this part of the range, occasionally unlobed or 5-lobed; cotyledon lobes ordinarily not widely flared, but sulcus between lobes is usually relatively deep; entire plant is usually thickly covered with coarse, straw-colored hairs, calyx particularly well supplied with tomentum so that glands though present are not always readily visible; edges of sepals rolled together making a cross-section of the portion of the sepal which projects beyond the ovary U- or horseshoe-shaped; rarely exhibits abundant pigment in stem above cotyledons, and never in abruptly distinct patches; ordinarily no more than 3 flowers to a single peduncle, often only one. An abundant weed in cultivated fields and recently disturbed ground, but appears unable to compete with other plants in sod or woodland. This species has usually finished blooming, and ripened its seed crop well before the first frost in autumn. Outline of the type of leaf-blade most frequently observed and of cotyledon. fig. 1 h.

8. *Ipomoea purpurea* (L.) Roth. Leaves usually entire in this part of the range, but may be deeply 3- or 5-lobed; cotyledon lobes never widely flared, and sulcus between lobes is relatively shallow; entire plant is sparsely puberulous, thus glands on calyx usually appear prominent; individual sepals flattened in cross-section, not involute; cross-section of sepal may be cresent-shaped, but is never U- or horseshoe-shaped; stems frequently display long patches of dark purple pigment on the side exposed to sunlight (even in white-flowered specimens), with an abrupt line of demarcation between pigmented area and the pale green portion of stem that is ordinarily shaded; frequently as many as 5 flowers in one inflorescence. Common weed in fields and gardens, but apparently cannot persist in grassland or woods: "Crimson Rambler," "Rose Marie," and "Tinkerbell's Petticoat" are all cultivated forms of this species. Continues to bloom profusely in autumn till frost. Outline of leaf-blade and cotyledon, fig. 1 i.

## LITERATURE CITED

Brown, E. D. 1946. Notes on some variations in field bindweed (*Convolvulus arvensis* L.) *Iowa State Coll. Jour. Sci.* 20: 269-276.

Fernald, M. L. 1950. Gray's Manual of Botany. Eighth Ed. American Book Co. New York. 1632 pages.

Gleason, H. A. 1952. The New Britton and Brown Illustrated Flora. Vol. 3. New York Botanical Garden. New York. 589 pages.

Hallier, H. 1893. Versuch einer naturlicher Gliederung der Convolvulaceae. In Engler's botan. Jahrbucher 16: 453-591.

Lawrence, G. H. M. 1951. Taxonomy of Vascular Plants. Macmillan. New York. 823 pages.

Van Ooststroom, S. J. 1938. The Convolvulaceae of Malaysia, I. *Blumea* 3: 62-94.

# A STUDY OF THE CHLOROPHYTA OF THE JAMES RIVER BASIN, VIRGINIA[1]

## I. COLLECTION POINTS AND SPECIES LIST.

BERNARD WOODSON, JR.
*Virginia State College*

### OBJECTIVES OF THIS STUDY

This is an investigation of the distribution, classification and ecology of the Chlorophyta of the James River Basin. The primary objectives of this work have been: (1) the collection and identification of green algae (Chlorophyta) from representative points along the James River Basin; (2) the determination, where possible, of the geological or soil features and chemical factors related to the distribution of Chlorophyta along the James River Basin; and, (3) the assembling of ecological data concerning algal development in the streams concerned in general.

Need for this work was brought to the attention of the writer by his advisor, Dr. G. W. Prescott. It was suggested that since no formal study had been made on the distribution and ecology of green algae in the area covered by this report, that it would be well to make such a survey. Several persons have reported organisms from different points in Virginia, but for the Chlorophyta along the James River Basin it is virgin territory. J. C. Strickland, (1942)[2], has made a survey of blue-green algae, H. S. Forest (1954) has presented a check list of algae in the vicinity of Mountain Lake Biological Station, Virginia, S. L. Meyer (1940) has reported species of Phacus, and Vivian Farlow (1928) has reported on algae of ponds, from tadpole intestine. It was also suggested by Dr. Prescott that the writer try to associate as many factors (ecological, parent rock, soil regions, water chemistry, etc.) with the distribution of the Chlorophyta along the James River Basin as possible. The investigation was started during the summer of 1953.

THE PRESENT STUDY — The results of the complete study will be published in several articles. The present article will list in detail the collection points, as well as the 89 species of Chlorophyta encountered.

METHODS AND PROCEDURE — In order to carry out the major objectives of this problem, representative water samples were collected from points along the James River. This was done by taking samples

[1] A survey made as partial fulfillment for the requirements for the Ph.D. degree at Michigan State University.

[2] Literature citations will appear in a later paper in this series.

from tributaries emptying into the James River on both sides making certain that all main streams were represented from headwaters to the mouth of the river.

The distance from origin to mouth of the James is approximately 300 miles, but it was necessary to travel over one thousand miles to make a complete survey of the area studied for each sampling period.

The first collections were made in August of 1955. Samples were taken from both sides of the James making certain that representative samples were taken from each county bordering the river. This was done mainly with the desire of obtaining samples from each parent soil type. As shown by the soils map, many of the counties had the same physiography.

At least two, often many more, samples, however, were taken from streams emptying into the James from each county. This procedure was adhered to as closely as possible, for the winter collection 1955-56 and spring collection 1956. A total of 97 points were sampled by the author, and Dr. Strickland of the University of Richmond contributed 16.

In surveying the tributaries, all macroscopic algal growth were sampled. In many instances soil samples of stream bottoms were collected even though there was no definite sign of algal growth. Also samples of twigs, leaves, rocks or other debris were collected for examination. Observations were made as to the speed of the currents of the streams, type of bottom and where possible, the various species or genera of higher plants of the stream and bordering banks. Plankton samples were also obtained from many of the larger bodies of water. The samples were preserved in Transeau's solution, known as 6-3-1 (6 parts water, 3 parts ethyl alcohol and 1 part commercial formalin).

In the summer of 1956, the author again covered the same distance taking samples of water from the main tributaries for chemical analyses and also taking the pH of the explored streams. The chemical analyses of these waters had already been made by the Department of Conservation, Division of Water Resources, but phosphorus analyses had been omitted from the data by the Conservation Department of Virginia; therefore, the author made phosphorus determinations using the "Molybdate Colorimeter Method."

The materials collected were examined in the laboratory and the species found in each collection were recorded. A drawing of each species observed was made with the camera lucida.

COLLECTION POINTS – The several points, with brief remarks concerning each are listed below. Following these data will be found the taxonomic list, which includes 89 species with collection points of each taxa being indicated.

| No. | Location | Stream Profile | Higher aquatics |
|---|---|---|---|
| 1 | Rt. 147 – stream draining Richmond Country Club. | Slow flowing, sandy | None |
| 2 | Creek draining dam off Rt. 147, ¼ mile south of James River, Chesterfield Co. | Slow flowing, muddy | None |
| 3 | Creek and Small Lake, 10 miles West of Richmond, Chesterfield Co. | Slow flowing, muddy | Reed grass, sumac and others |
| 4 | Bernard's Creek, Rt. 711 Powhatan Co. | Slow flowing, sandy | *Veronica* sp. |
| 5 | Norwood Creek, Rt. 711, Powhatan Co. | Slow flowing, sandy | None |
| 6 | Fine Creek, Rt. 711, Powhatan Co. | Slow flowing, rocky and sandy | Moss growth, *Veronica* sp. |
| 7 | Beaver Dam Creek, Rt. 6, Goochland Co. | Swift, rocky | None |
| 9 | Tuckahoe Creek, Rt. 6, Goochland Co. | | None |
| 10 | Creek ¼ mi. E. of Rt. 147 on Riverside Drive, Henrico Co. | Rocky, slightly swift | None |
| 11 | Falling Creek, Rt. 1, Chesterfield Co. | Rocky and swift | None |
| 12 | Kingland Creek, Rt. 1, Chesterfield Co. | Rocky, swift | None – seemed polluted |
| 13 | Appomattox River, Hopewell, Va., Prince George Co. | Sandy, mucky, slow flowing | Marsh, water lillies, Reed grass, etc. |
| 14 | Small Creek W. of Turkey Island on | Rocky, fairly swift | *Sparganium* sp. |

| | | | |
|---|---|---|---|
| 13 | Appomattox River, Hopewell, Va., Prince George Co. | Sandy, mucky, slow flowing | Marsh, water lilies, Reed grass, etc. |
| 14 | Small Creek W. of Turkey Island on Rt. 5, Henrico Co. | Rocky, fairly swift | *Sparganium* sp. |
| 15 | Turkey Island Creek, Rt. 5, Charles City Co. | Sandy, slow | *Potamogeton* sp. |
| 16 | Herrin Creek, Rt. 5, Charles City Co. | Rocky, sandy and swift | Moss vegetation |
| 17 | Gunns Run, Rt. 5, Charles City Co. | Rocky and swift | *Veronica* sp. |
| 18 | Creek Rt. 5 between Gunns Run and Morris Creek, Charles City Co. | Rocky and fairly swift | *Potamogeton gramineus* |
| 19 | Morris Creek, Rt. 5, Charles City Co. | Sandy, rather swift | *Sparganium* sp. |
| 20 | Chickahominy River, Rt. 5, James City Co. | Sandy and slow | Elodea canadensis, *Valisneria* sp. *Cyperus americana* |
| 21 | Overflow from Matoaka Lake, Williamsburg, Va., Rt. 31. | Silty, slightly swift | *Ceratophyllum demersum* |
| 22 | Water Creek, Warwick Co. Rt. 60 | Muddy and slow | None |
| 23 | Mouth of James River — Hampton Roads | Highly salty and sandy | None |
| 24 | Cypress Creek, Smithfield, Va. Isle of Wight Co. | Sandy, swift and brackish | Reed grass, rushes, etc. |
| 26 | Creek W. of Lawny Creek on Rt. 10 Surry Co. | Sandy and fairly swift | None, algal growth on shells & debris |
| 27 | Cypress Swamp, Rt. 10, Surry Co. | Rocky and slow | Water cress |

| | | |
|---|---|---|
| 28 Ward's Creek, Rt. 10, Prince George Co. | Rocky and swift | *Potamogeton gramineus, P. Illinoiensis, Heteranthera dubia* |
| 29 Powells Creek, Rt. 10, Prince George Co. | Slow, muddy | *Potamogeton pusillus* |
| 30 Chickahominy River, Rt. 60, New Kent Co. | Muddy and fairly swift | *Cavex* sp. *Typha latifolia and Potamogeton* sp. |
| 32 Cheney's Creek, Rt. 6, Goochland Co. | Swift and sandy | None |
| 33 Byrd Creek, Rt. 6, Goochland Co. | Fairly swift, rocky and sandy | None |
| 34 Rivanna River, Rt. 6, Fluvanna Co. | Swiftly flowing and rocky | *Ranunculus* sp. |
| 35 Hardware River, Rt. 6, Fluvana Co. | Rocky and swift | *Lythrum* sp. |
| 36 Muddy Creek, Rt. 20, Buckingham Co. | Muddy, swift | None, Algae growing on rocks |
| 38 Small stream W. of Willis River on Rt. 60, Buckingham Co. | Muddy, slow | None, Algae on rocks and side of banks |
| 39 Willis River, Rt. 60, Cumberland Co. | Slow and muddy | None |
| 40 Deep Creek, Rt. 60, Cumberland Co. | Slow and muddy | None |
| 41 Falling Creek, Rt. 60, Chesterfield Co. | Fairly swift, mucky | None |
| 42 Appomattox River, Petersburg, Va. | Fairly swift, rocky and polluted | None |
| 44 Swift Creek, Rt. 1, Chesterfield Co. | Swift and rocky | *Veronica* sp. |
| 45 Appomattox River, Two mi. above Petersburg in Chesterfield Co. | Quite swift and rocky | None, seemed polluted. |

| | | |
|---|---|---|
| 44 Swift Creek, Rt. 1, Chesterfield Co. | Swift and rocky | *Veronica* sp. |



| | | |
|---|---|---|
| 45 Appomattox River, Two mi. above Petersburg in Chesterfield Co. | Quite swift and rocky | None, seemed polluted. |
| 46 Swift Creek, Rt. 602, Chesterfield Co. | Fairly swift and rocky | None, algae on rocks and soil |
| 47 David Creek, Rt. 60, Appomattox Co. | Fairly swift, slate rock | None, Algae on rocks and soil |
| 48 Bent Creek, Rt. 26, Appomattox Co. | Swift and rocky | None, Algae on rocks, branches and soil |
| 50 Little Beaver Creek, Rt. 460, Campbell Co. | Swift and rocky | None, Algae on debris and rocks |
| 51 Appomattox River, Rt. 24, Appomattox Co. | Swift and rocky | None |
| 52 Judith Creek, Rt. 501, Bedford Co. | Swift and sandy | None |
| 53 Battery Creek, Blue Ridge Pkway, Rockbridge Co. | Swift and rocky | None, algae on rocks |
| 54 Looney Creek, Rt. 220, Botetourte Co. | Swift and rocky | *Carex* sp., Chicory, *Labiatae*, legumes All overhanging. |
| 55 Catawba Creek, Rt. 220, Botetourte Co. | Slow, muddy | *Spirogyra* sp. |
| 56 Lapsley Run, Rt. 220, Botetourte Co. | Swift and rocky | None, grasses, golden rods and willows overhanging |
| 57 Craigs Creek, Rt. 220, Botetourte Co. | Swift and rocky | *Potamogeton* sp. *Elodea canadensis*, *Lysimachia* sp. and *Chara* sp. |

| | | |
|---|---|---|
| 58 Mills Creek, Rt. 220, Botetourte Co. | Swiftly flowing, rocky | None, seemed polluted. |
| 59 Sinking Creek, Rt. 220, Botetourte Co. | Slow flowing with shale bottom | None, algae on rocks |
| 60 Jackson River, Rt. 60, Allegheny Co. | Swift, rocky | Heavily polluted, algae on rocks. *Veronica* sp. |
| 61 Ogle Creek, Allegheny Co. | Swift, rocky | None, Good growth of algae under bridge and near banks |
| 62 Wilson Creek, Allegheny Co. | Swift, rocky | None. Algae on rocks |
| 63 Cow Pasture River, Rt. 60, Allegheny Co. | Swift, rocky | *Potamogeton, Lysimachia* sp. |
| 64 Simpson Creek, Rt. 60, Allegheny Co. | Swift, rocky | None |
| 65 Keers Creek, Rt. 60, Allegheny Co. | Slow, rocky | None |
| 66 Pedlar River, Rt. 60, Amherst Co. | Swift, rocky | Liverworts, mosses, Algae on rocks |
| 68 Rockfish River, Rt. 29, Nelson Co. | Swift, muddy | None. Poor algal growth on rocks, debris |
| 69 Westhampton Lake, University of Richmond | | |
| 70 Temporary Pool — Huguenot Bridge Chesterfield Co. | | |
| 71 Granite Quarry — Chesterfield Co. | | |

71 Granite Quarry — Chesterfield Co.



72 Ditch along railroad — Northside of James River, Henrico Co.

73 Swamp, 10 miles west of Richmond, Rt. 6, Henrico Co.

| | | |
|---|---|---|
| 74 Maury River, Rt. 60, Buena Vista, Va. | Quite large, slow and muddy | *Potamogeton crispus*<br>*Elodea canadensis* |

Collection points No. 8, 25, 31, 37, 43, 49 and 67 were omitted because no Chlorophyta were found to be present.

## TAXONOMIC LIST

(Numbers in parenthesis refer to collection points as listed above.)

Division Chlorophyta

Class Chlorophyceae

Order Volvocales

Family Volvocaceae

*Pandorina morum* Bory (69)

*Eudorina elegans* Ehr. (13) (72)

Order Tetrasporales

Family Palmellaceae

*Gloeocystis gigas* (Kutz) Lagerh (30) (52)

*Tetraspora lubrica* (Roth) Agardh (14) (15) (16) (28) (29) (45)

Family Coccomyxaceae

*Dispora crucigenioides* Printz (65)

*Coccomyxa dispar* Schmidle (71)

Order Ulothrichales

Family Ulotrichaceae

*Ulothrix tenerrima* Kutz (11) (12) (27)

*U. zonata* (Weber and Mohr) Kutz (4) (22) (23) (53) (64)

Family Trentepohliaceae

*Lochmium piluliferum* Printz (57)

Order Microsporales

Family Microsporaceae

*Microspora amoena* (Kutz.) Rab. (4) (6) (16) (17)

*M. Willeana* Lagerheim and Detoni (12)

Order Chaetophorales

Family Chaetophoraceae

*Stigeoclonium stagnatile* (Hazen) Collins (34)

*S. subsecundum* Keutzing (1) (10) (11) (12) (15) (69)

*Chaetophora elegans* (Roth) Agardh (15) (22) (42)

*C. incrassata* (Hads.) Hazen (73)
*Draparnaldia glomerata* (Vauch.) Agardh (72)
*D. platyzonata* Hazen (3) (44) (45) (73)
*D. plumosa* (Vauch.) Agardh (22) (42) (62) (66) (69) (72)

Order Cladphorales

Family Cladophoraceae

*Cladophora callicoma.* Keutz (21)
*C. insignis* Keutz (54) (64)
*Pithophora kewensis* Wittr. (42)
*Rhizoclonium hieroglyphicum* (Ag.) Kutz (20) (32) (35) (42) (74)

Order Ulvales

Family Ulvaceae

*Enteromorpha prolifera* (Fl. Dan.) Agardh (24)
*Ulva lactuca* Linn. (23)

Order Oedogoniales

Family Oedogoniaceae

*Oedogonum echinospermum* Braun and Keutz (6)
*Oe. minor* Witt. (13)

Order Chlorococcales

Family Hydrodictyaceae

*Hydrodictyon reticulatum* (L) Lager. (74)
*Pediastrum duplex* – var *clathratum* (Braun) Lagerh. (13) (20) var. *reticulatum* Lagerh. (20)
*P. integrum* Naegeli (20)
*P. simplex* (Meyen) Lemmer (61)

Family Coelastraceae

*Coelastrum cambricum* Archer (46)

Family Oocystaceae

*Eremosphaera viridis* DeBary (24)

Family Scenedesmaceae

*Scenedesmus quadricauda* (Turp.) Breb. (22) (46)

Order Zygnematales

Family Zygnemataceae

*Spirogyra aplansopora* Rand. (69)
*Sp. cleaveana* Traus. (3) (69)
*Sp. communis* (Hass.) Keutz
*Sp. crassa* Keutz. (5) (34) (36)
*Sp. denticulata Trans.* (15)
*Sp. insignis* (Hass.) Keutz (42)
*Sp. mirabilis* (Hass.) Keutz (69)
*Sp. protecta* (2)
*Sp. semiornata* Jac. (69)
*Zygnema insigne* (Hass.) Keutz (71)

Family Desmidiaceae

*Closterium acerosum* (Schrank) Ehren. (42)
*Cl. abruptum* var. *africanum* (West) Kreiger (19) (46)
*Cl. Dianae* Ehren. (6) (16)
*Cl. didymotocum* Ralfs. (40)
*Cl. Leibleinii* Keutz. (6) (69)
*Cl. littorale* Gay (38) (46) (48) (53)
*Cl. moniliforme* (Bory) Ehren. (2) (6) (19) (33) (38) (41) (46) (52) (61) (64) (68)
*Cl. Pritchardianum* Archer (1) (52) (71)
*Cl. praelongum* Brab (46)
*Cl. rostratum* Ehren. (40) (46)
*Cl. tumidum* Johnson (40) (48) (62) (65)
*Cl. tumidulum* (40)
*Cosmarium formosulum* var. *nathorastii* (Boldst.) W. & W. (40) (54) (56)
*Cos. fomosulum* Boldst. (54) (56) (57)
*Cos. meneghini* Breb. (46) (57) (71)
*Cos. margaritatum* (Lund). Roy & Bliss (59)
*Cos. pseudoconnatum* Nordst. (40) (58) (59)
*Cos. pseudopyramidatum* (58)
*Cos. punctulatum* var. *subpunctulatum* (Nordst.) Berg. (4) (33) (48) (58) (68)
*Cos. subreniforme* Nordst. (40)

*Cylindrocystis diplospora* Lund. (71)
*Desmidium Baileyi* (Ralfs.) Nordst (59)
*D. Swartzii* Agardh. (6) (7) (16) (57) (59)
*Euastrum verrucosum* var. *alatum* Wolle (6)
*Hyalotheca dissiliens* (J. E. Smith) Breb. (3) (15) (28) (38) (39) (45) (57) (59) (71)
*Hy. mucosa* (Dillw.) Ehren. (22)
*Micrasterias americana* (Ehren.) Ralfs. (6)
*M. sol.* (Ehren.) Keutz (6) (39)
*M. truncata* (Corda) Breb. (57) (58)
*Penium margaritaceum* (Ehren.) Breb. (1) (33) (64)
*Pleurotaenium cylindricum* Ralfs. (6) (39)
*Pl. Ehrenbergii* (Breb.) DeBary (59)
*Staurastrum alternans* Breb. (17) (38) (48) (65)
*Str. Brebissonii* Archer (13)
*Str. Dickei* Ralfs.
*Str. gracile* Ralfs. (22)
*Str. orbiculare* var. *hibernicum* West and West (57)
*Str. punctulatum* Breb. (66)

Class Charophyceae

Order Charales

Family Characeae
Tribe Nitelleae
*Nitella opaca* Agardh. (18)
Tribe Chareae
*Chara Braunii* Gmelin (64)
*C. fragilis* Desv. and Loisel. (57) (63) (61)

Division Euglenophyta

Class Euglenophyceae

Order Euglenales

Family Euglenaceae
*Euglena Spirogyra* Ehren. (65)

Division Chrysophyta

Class Xanthophyceae

Order Heterosiphonales

Family Vaucheriaceae

*Vaucheria aversa* Hass. (15) (19) (69)

*V. discoidea* Taft. (33) (72)

*V. geminata* (Vauch.) DeCand. (30) (42)

*V. sessilis* (Vauch.) DeCand. (14)

Division Rhodophyta

Class Rhodophyceae

Subclass Florideae

Order Nemalionales

Family Batrachospermaceae

*Batrachospermum virgatum* (Kuetz.) Sin. (4) (9) (16) (17) (18) (19) (26) (28) (29) (34)

Subclass Bangiodes

Order Ceramiales

Family Ceramiaceae

*Ceramium rubrum* (Huds.) C. Ag. (23)

Family Erythrotrichiaceae

*Compsopogon coeruleus* (Balbis) Mont. (5)

Although this is an investigation of the *Chlorophyta*, the author has included in the Taxonomic list several species of *Rhodophyta* and *Chrysophyta*. These species were included because some appeared quite frequently in collections, and it was thought that these forms may be of interest to some biologist.

# News And Notes

*(Editor's Note: News contributions should be sent to the person whose name appears at the end of the appropriate sections.)*

## MINUTES OF THE COUNCIL MEETING
Longwood House — October 19, 1958

The Council of the Virginia Academy of Science, together with Committee and Section representatives, met at Longwood House in Farmville, president Forbes presiding.

Council members present were as follows: Ralph A. Bradley, Robert T. Brumfield, Walter S. Flory, Jr., William G. Guy, William M. Hinton, Horton H. Hobbs, Jr., George W. Jeffers, Harry G. M. Jopson, Charles F. Lane, Paul M. Patterson, and Foley F. Smith.

Those representing Committees and Sections were as follows:

Sections:

Franklin D. Kizer, *Science Teachers.*
B. A. Niemeier, *Engineering*
S. S. Obenshain, *Agricultural Science*
W. T. Parrott, *Geology*
William W. Scott, *Biology*
Jackson J. Taylor, *Astronomy, Mathematics and Physics*
Frank A. Vingiello, *Chemistry*

Committees:

L. D. Abbott, Jr., *Business Memberships*
I. G. Foster, *History of Science*
Boyd Harshbarger, *Institute for Prospective College Seniors and Their College Teachers*
J. C. Holmes, *Science Talent Search*
S. P. Maroney, Jr., *Arrangements for 1959*
Sydney S. Negus, *Awards*
Nolan E. Rice, *Resolutions*

Since the minutes had been circulated a motion was passed to dispense with the reading.

The subject of the James River Basin Association tabled at the last meeting was left tabled.

Dr. Harshbarger reported on his conference concerning raising money for an Institute for the Exceptional College Students in the Sciences. It appeared that the National Science Foundation might be interested in this. After considerable discussion the following motion was formulated for Dr. Negus and passed:

That Council accepts and approves the report of The Science Conference Committee of which Dr. Harshbarger is Chairman and directs this Committee to continue their work towards inauguration of this plan with the approval of The Virginia Academy of Sciences. The President is authorized to sign the application for the Academy.

Mr. Foley Smith reported on sales of the "James River Basin" and reprints of the Journal Issue for The Jamestown Festival. Mr. Smith moved that the Committee on James River Project be dissolved. This motion was passed. Future sales of this book, however, would be credited as before.

Mr. Maroney brought up several problems that faced his Planning Committee. One concerned rental that would be charged for use of the Student's Activities Building. Council passed Dr. Flory's motion to the effect that his Committee may use Academy funds for this purpose up to $400 as they see fit.

Mr. Maroney brought up the question of a tea in the Rotunda. Opinion was somewhat divided but Council approved a tea for May, 8, 1959 at 5-6 p.m.

Dr. Forbes called attention to a letter from A. T. McPherson, President of the District Academy over possible conflict with their Junior Academy and ours in the adjoining Virginia territory where they are active. Council would foresee no conflict and designated President Forbes to reply.

Dr. Jackson Taylor pointed out that there was sentiment among the mathematicians to form an independent Section. He was advised that this is the wishes of the group and is always accepted by the Academy on a two year trial basis as indicated in Article 9 Sections 1 and 2 of the Constitution.

Dr. Bradley formulated a procedural basis for awarding research funds which he plans to publish in the Journal. Council listened with comments which centered chiefly around the eligibility clauses for awards, but reminded him that his Committee was autonomous.

Mr. Lane pointed out that the printing contract for the Journal would soon expire and a new one should be negotiated. Dr. Flory moved that the Editor and Business Manager of the Journal be empowered to do so. This motion was passed.

Dr. Negus reported the Awards Committee had nominated Lloyd C. Bird for the Distinguished Service Award. Dr. Flory put this in the form of a motion and Council approved the nomination unanimously.

Dr. Guy made, and Council passed, a motion that Dr. N. F. Murphy be commended for the outstanding job he did in obtaining commercial exhibits at the 1958 Roanoke meeting.

The President reported that R. W. Engel was appointed to the Research Committee for two years, because of C. L. Gemmill's resignation, and would become Chairman at Gemmill's rotational year (Engle's second) in order to preserve the sequential continuity of this Committee.

President-elect Hinton reported Ed Berkeley is Chairman of the Local Arrangements Committee for the 1960 meeting in Richmond with Jefferson Hotel as headquarters. The Academy speaker, he said, would be Harry Harlow, a student of primates. Adjournment.

Paul M. Patterson, *Secretary.*

## AMERICAN TOBACCO COMPANY

Dr. William R. Harlan, Managing Director, Department of Research and Development, The American Tobacco Company, announced the appointment of two supervisors in the Quality Control and Improvement of Products Division. Oswald N. Coty has been named Supervisor of Essential Materials and Ralph R. Chesson, Supervisor of Tobacco Control.

The following personnel changes at the Research Laboratories of The American Tobacco Company were announced by H. R. Hanmer, Vice President, Research Department: William R. Harlan, formerly Assistant Director of Research was named Managing Director, Research and Development. He received his B. S. degree from New Mexico State University and his Doctor's degree in Plant Chemistry from Iowa State College.

Edward S. Harlow was appointed Assistant Managing Director, Research and Alexander W. Schoenbaum, Assistant Managing Director, Development. Both Mr. Harlow and Mr. Shoenbaum are natives of Richmond, Virginia and are graduates of the University of Richmond.

Other appointments, according to the Vice President, were as follows: John M. Moseley, Assistant to Vice President and to Managing Director, Research and Development; Overton L. Hillsman, Executive Assistant; Claiborne E. Brogden, Assistant to Managing Director, Research and Development; Blanton M. Bruner, Assistant to Managing Director, Research and Development; Clarence H. Rayburn, Supervisor of Research; John T. Ashworth, Supervisor of Development.

## AGRICULTURAL SCIENCES

Dr. C. J. Ackerman of the Department of Biochemistry and Nutrition, Virginia Polytechnic Institute, participated recently in a conference called by the National Research Council, Washington, D. C., to consider the use of ethylene oxide gas as a sterilizing agent for human blood plasma. Dr. Ackerman's advice was sought because of his recent researches on the effect of the sterilizing gas on the nutritional value of proteins.

W. W. Osborne, Associate Extension Plant Pathologist, Virginia Polytechnic Institute, has been granted two years educational leave to work on his Ph. D. degree in plant pathology. Dr. Robert Pristou is substituting for Mr. Osborne during his leave.

The Department of Vocational Education, Virginia Polytechnic Institute, cooperating with the State Department of Education and the teachers of vocational agriculture, has just completed a follow-up study of approximately 71,000 former students of vocational agriculture. The chief purpose of the study was to answer the question: What becomes of boys who study vocational agriculture in the high school? Copies of the study are available from the Department of Vocational Education.

The National Science Foundation has announced that Dr. M. D. Lane, Associate Professor of Biochemistry and Nutrition, Virginia Polytechnic Institute has been awarded a three-year grant in the amount of $17,200.00 for the study of the metabolism of fatty acids by animal tissues.

The National Institute of Health has awarded a sum of $25,530.00 to support basic agricultural research at the Virginia Polytechnic Institute under the direction of Dr. K. W. King in the Department of Biochemistry of Biochemistry and Nutrition. Approximately half of the funds will be used for graduate assistantships. The research is an attempt to learn the details of how bacteria and fungi decompose cellulose. Understanding of the process is intended to lead to ways of improving cattle and sheep nutrition, maintenance of soil fertility, sewage disposal, and cotton fabric preservation.

Dr. R. W. Engel, Head of the Department of Biochemistry and Nutrition at Virginia Polytechnic Institute has been appointed to the Editorial Board of the newly-created scientific journal, *Toxicology and Applied Pharmacology*.

Need for the journal arose from the rapid postwar increase in the use of new chemicals in drugs, cosmetics, food processing, and agriculture. Protection of the public from unsuspected toxic effects of the new chemicals can only be assured by extensive research to establish their safety prior to commercial use. The Journal of *Toxicology and Applied Pharmacology* will serve the scientific world as a means of reporting the results of such research.

James F. Eheart, Associate Professor of Biochemistry, Virginia Polytechnic Institute attended a National Pesticide Residue Conference at Washington, D. C., in January. This meeting was sponsored by the U.S. D.A. and the Federal Food and Drug Administration.

Mr. Robert K. Reynolds has been appointed Assistant Extension Agricultural Economist, Virginia Polytechnic Institute, to work in Farm Management. Mr. Reynolds holds a B. S. degree from Virginia Polytechnic Institute and is now working part-time on his M. S. degree. He served for a period of two years with the Virginia Agricultural Extension Service.

— Carl W. Allen

## CHEMISTRY

A new Infra-Cord has just been installed in the physical chemistry laboratory at Virginia Military Institute. The cost of the instrument was partially met by a grant of $2500 from the Hercules Power Company.

A new lecture room at the Institute, seating 250, is nearing completion and will be ready for occupancy about March 1.

New instructors added to the Virginia Military Institute staff include: Mr. John Borders of Wake Forest, Lt. William Corr, Lt. Theron Henry and Lt. William Sink of Virginia Military Institute.

— M. A. Kise

## ENGINEERING

Professors Fred W. Bull and Nelson F. Murphy of the Chemical Engineering Department, Virginia Polytechnic Institute, attended the annual meeting of the American Institute of Chemical Engineers held in Cincinnati, Ohio in December. Professor Bull has announced the appointment of Dr. Stuart B. Row as Professor of Chemical Engineering.

Dr. Row received his B. S. and M. S. degrees from the Virginia Polytechnic Institute and his Ph.D. from Ohio State University. Formerly he taught at the Virginia Polytechnic Institute and at Southwestern Louisiana Institute of Technology. He has most recently been employed by the American Viscose Company and O'Sullivan Rubber Company. Professor Bull has announced that the Chemical Engineering Department will move into its new building during the summer of 1959. This new facility will provide expanded space for research, instruction and offices. In addition to general laboratory space, special laboratories will be provided for instrumentation, corrosion, electrochemical processes, and nuclear chemical engineering. U. S. Patent Number 2,848,396 covering an electrochemical method for preparing boron from fused salt mixtures has been issued to Professor Nelson E. Murphy and Dr. Richard S. Tinsley, now with Allied Chemical and Dye Corporation, Hopewell, Virginia.

Mr. Tilton E. Shelburne of the Virginia Council for Highway Investigation and Research, attended the annual meeting of the Highway Research Board in Washington in January. He presented two papers: "Resume of the First International Skid Prevention Conference" and "Review of Laboratory and Field Methods of Measuring Road Surface Friction." As a director from District Six of the American Society of Civil Engineers, Mr. Shelburne attended the annual meeting of the Pittsburgh Section in January. In February he traveled to Los Angeles to attend the meeting of the National Board of Directors of the ASCE.

Dean Lawrence R. Quarles of the School of Engineering, University of Virginia, attended the meeting of the American Nuclear Society in Detroit in December. He is a member of the Board of Directors and is Chairman of the Education Committee. Dr. Orville R. Harris of the Electrical Engineering Department, University of Virginia, has been elected Vice-Chairman of the Virginia Section, Institute of Radio Engineers.

Professors Otis L. Updike and Robert M. Hubbard of the Chemical Engineering Department, University of Virginia, attended the annual meeting of the American Institute of Chemical Engineers in Cincinnati in December. Dr. Updike presented a paper "The Laboratory Period in the Process Control Course." Dr. Updike has been awarded a National Science Foundation Science Faculty Fellowship for the academic year 1959-1960. He will study at California Institute of Technology. Professor Hubbard has been elected Vice-Chairman of the Central Virginia Section of the American Institute of Chemical Engineers.

— Robert M. Hubbard

## GEOLOGY

Dr. Edgar W. Spencer has been named Associate Professor of Geology and Chairman of the Department at Washington and Lee University.

The Washington and Lee faculty will be increased to three members in 1960. The present faculty has added to the geology curriculum courses in paleontology, stratigraphy and sedimentation, field methods, and basic geological concepts and has adopted a new set of major requirements for geology majors.

— Bruce W. Nelson

## PSYCHOLOGY

A recent addition to the Psychology Department, College of William and Mary is E. Rae Harcum, Assistant Professor. Dr. Harcum, whose current field of interest is in visual perception, earned his B. S. at William and Mary, 1950; M. A. at Johns Hopkins, 1952; Ph.D. at University of Michigan, 1955. He is taking the place of John K. Bare who accepted the chairmanship of Psychology Department at Carleton College. Charles R. Hayward of Harvard College and Brown University has also joined the staff. Mr. Hayward is interested in information theory and Skinnerian behaviorism.

Frank A. Geldard chaired a symposium on "The Human As a Measuring Instrument" at the AAAS meetings in Washington on December 28. Professor Geldard was elected Chairman of Section I (Psychology) and was also elected Vice-President of the AAAS.

Frank W. Finger participated in the Miami Conference on Graduate Education in Psychology, attended by 120 psychologists of various affiliations, from November 29 to December 7. Among the noteworthy viewpoints aired at the conference was the following: An attempt to minimize the distinction between science and profession, stressing that all psychologists should have a primary orientation toward investigation with a secondary interest in service. Since it is impossible to anticipate precisely the directions in which Psychology will develop, the preeminent goal of graduate education must be to foster flexibility and continuing growth in the individual. General principles might be emphasized more than specialized techniques, leaving the latter to post-doctoral experience; in any case, graduate departments are to be encouraged to experiment freely, albeit responsibility, with a variety of programs. The demand for psychological services will exceed the supply available at the Ph.D. level, so more attention ought to be given to the problems of training and

utilization of non-doctoral personnel. In order to attract a fair share of the manpower pool into Psychology, it seems desirable to introduce the concept of Psychology as a research discipline into the secondary school curriculum, and it is imperative that positive steps be taken to invigorate the teaching of Psychology at the college level.

John F. Hurley announces that the staff of School Psychologists of Fairfax County has completed the first year of a study "Comparative Effectiveness of Four Basal Reading Series" in which the primary reading programs of four publishers were compared on equated groups under controlled conditions. This work, which will continue for another year, is part of a larger project in which the series of six additional publishers is being evaluated. The staff, which includes Robert Lanagan, Gloria McDowell, Catherine Murphy, and Richard Schillo, have also made a comparative study of two achievement tests, the California and the Stanford, and have conducted a controlled evaluation of a half-day versus a full-day program for first grade children.

John F. Hahn read an invited paper, "Communicating Via The Skin" at the meetings of the Speech Association of America in Chicago on December 29.

Reuben S. Horlock, formerly Chief Clinical Psychologist, Audiology and Speech Center, Walter Reed Army Hospital, has been appointed Chief, Psychological Services Center, Department of Corrections, District of Columbia. He will be responsible for designing, developing and administering a psychological treatment and research program for a selected inmate population at the District of Columbia Reformatory.

Antania Bell Morgan delivered a paper at the AAAS meetings in Washington in December on "Critical Factors in the Acceleration of Gifted Children: A Follow-up Study."

The Division of Behavioral Science, Department of Neurology and Psychiatry, University of Virginia School of Medicine announces its first Annual Symposium, "Experimental Foundations of Clinical Psychology," to be held at Charlottesville, Virginia, April 1 and 2, 1959. The members of the Symposium are Janet A. Taylor, Northwestern University, Robert B. Malmo, McGill University, Murray Sidman, Walter Reed Army Institute of Research, Irwin A. Berg, Louisiana State University, Jack A. Vernon, Princeton University, and John H. Weakland, Veterans Administration Hospital, Palo Alto, California. The Symposium will be under the chairmanship of Arthur J. Bachrach, University of Virginia. Information pertaining to attendance may be obtained by writing to Mrs. Katherine Tiffany, Secretary, Division of Behavioral Science, University of Virginia School of Medicine, Charlottesville, Virginia.

A workshop in "Play-Group Therapy" will be conducted by Haim G. Ginott, psychologist from the Child Guidance Clinic in Jacksonville, Florida, on April 9-12 in Richmond under the sponsorship of the State Department of Mental Hygiene and Hospitals.

— Cyril R. Mill

## CURRENT ACADEMIC PSYCHOLOGICAL RESEARCH IN VIRGINIA ON THEORETICAL AND APPLIED ISSUES

The geographical and institutional section of the *American Psychological Association 1958 Directory* lists some 70 psychologists participating in the activities of 20 colleges and universities throughout Virginia. The training of these persons was such that 43 of them hold the Ph.D. degree, conferred in years ranging from 1918-1957, with modal date being 1952. It may be inferred, then, that those awarded these degrees are a relatively young group of scientists with the pleasant addition of a few older heads. Of the total population, 18 hold the Master's degree. The remainder of the population consists of doctorates in education, largely, and law; three persons carry the Bachelor's degree as their highest earned diploma and one listed no degree. Virginia's psychologists are seen generally to be well qualified to do research work.

In order to ascertain the nature of psychological research in progress or in preparation, letters were mailed to each of the 70 psychologists. They were requested to send an abstract of each research project familiar to them, as well as the names of the principal investigators. The inclusion of some words regarding the theoretical or practical value of the project as well as the research design, was encouraged. After the lapse of a month a second and less demanding letter was addressed to all who had not yet responded. In this way replies were received from 33 psychologists representing 17 colleges and universities. Ten of the respondents indicated they were neither engaged in research, nor were they contemplating any. Six of these people held Master's degrees, three had doctorates in philosophy, and one listed no degree. Fortunately, many of those answering included information regarding the research projects of colleagues on the original list. Hence, information arriving in time for inclusion in the present report represented the research efforts of 61 accredited psychologists in 17 of the Old Dominion's academic institutions.

Psychological research may be roughly divided into three parts, clinical, theoretical, and applied. The present paper deals only with what the writer considered to be theoretical or applied experiments. Although clinical findings are not included in this report, it may be interesting to note that petulant correspondence was received exclusively

from those mostly engaged in theoretical investigations. Thus, the clinicians submitted their summaries with bland covering letters. Several of the theoreticians, however, responded that they did not have time to comply fully with the request. One offered "a program of college administration that is quite demanding," another noted that the difficulties of an adequate response were increased "by uncertain definition of 'research project.'" It was the experimentalists too who presupposed sapience in the present writer. For example, one brief but detailed report, involving several years of work, a dozen or so papers, and a brace of investigators, concluded by stating, "Of course, you are familiar with their general objectives . . . "

The general objectives of ongoing and recent experimental, psychological research in academic Virginia are presented herewith.

## LEARNING STUDIES: REINFORCEMENTS

The first of a series of experimental studies in the area of automation of learning is shortly to be completed by Diehl and Kent at Bridgewater College under a grant from the Virginia Academy of Science. This investigation is concerned with an examination of the relative effectiveness of learning nonsense syllables by machine presentation using various methods such as paired associates, anticipation, multiple choice, and written recitation. Depending upon the outcome of the first experiment on the effects of immediate reinforcement on rote memorization at the college level, later studies on foreign languages, organic chemistry, and biology will be undertaken.

Woods is investigating the effects of motivation and probability of reward on two-choice learning at Hollins College. Three experimental conditions involve motivation in the form of an aversive auditory stimulus, correction and noncorrection procedure, and a schedule of contigent reward. When the acquisition data were analyzed in the context of Estes' statistical learning theory, the main effect was found to be due to the probability of reward. A report of the experiment has been accepted for publication in the *Journal of Experimental Psychology*. Another manuscript soon to appear in that journal presents the relationship between probility difference and learning rate in a contigent partial reinforcement. In that experiment Woods found rate of learning to be directly related to probability difference.

Ogdon and Lebo, of the Richmond Professional Institute, have completed an interesting study of reward involving throwing darts at a genuine British pub dart board. It was their hypothesis, based on the goal-gradient theory, that more force would be exerted on dart throws

when subject had the opportunity to triple their raw score. Although experimenters and subjects alike enjoyed the experience, analysis of the graphic records has failed to support the hypothesis.

A variation of the effect of discrimination training conditions on secondary reinforcement is being examined experimentally at Hollins College by McGuigan.

Research aiming in the direction of establishing a more meaningful concept of motivation is being conducted by Finger and Reid at the University of Virginia. As they have proceeded in their study of patterns of ingestion in the rat, they have emphasized specific problems, such as: the interaction of eating and drinking, the physiological basis of thirst, the development of additional measures of biological drive, and the role of reinforcement upon general activity. Their work has received partial support by grants from the National Science Foundation and some results have been presented at professional meetings and in the *Journal of Comparative and Physiological Psychology* as well. Their most recent publication in that journal was entitled, "The Effect of Reinforcement Upon Activity During Cyclic Food Deprivation."

## OTHER LEARNING STUDIES

A project is presently underway at the University of Virginia to extend a recent study of paired-associates learning which purported to show that associations are formed in one trial rather than by gaining strength gradually. Battig is scaling nonsense syllable pairs for ease of learning in order to eliminate one variable contaminating the earlier procedure. Several other refinements of procedure and controls should provide a more rigorous test of the hypothesis. If it receives substantiation it will have tremendous importance with respect to conceptiualization of the learning process.

The influence of early experince on later behavior has been of interest to psychologists for some time. Studies of the effect of early environmental experience on intelligence as measured in an animal's maze solving ability has resulted in provocative experiments. Woods investigated the effects of subsequent free environmental experience on rats who were inferior problem solvers because of early, restricted environmental experience. Early environmental restriction was found to be related to maze learning deficiency. However, the effects of early sensory and motor deprivation can be markedly reduced by later exposure to an enriched environment.

McGuigan is experimenting with a variation of whole and part meth-

# Quality

*Products of*

*The American Tobacco Company*

"*Tobacco* IS OUR MIDDLE NAME"

ods of learning, the effect of delay of knowledge of results before and after a response, the effect of delay, precision and schedule of knowledge of results on performance, and the interfering effect of motor activity on knowledge of results.

### STUDIES IN THEORY AND DESIGN

Arising from McGuigan's empirical interest in whole and part methods is a paper entitled, "An Explanation of Whole-Part Learning in Terms of Hullian Theory." Similar considerations of his are, "The Delay of Knowledge of Results — A Problem in Design," and a criterion for choosing between matched and randomized group designs.

In a study soon to appear in *Psychological Reports*, it is shown that presentation of data in the form of cumulative response curves, in the manner of Skinner, is subject to the possibility of serious misinterpretation. Battig asked subjects to compare pairs of curves representing the same two sets of data plotted both cumulatively and non-cumulatively. He found the cumulative pair was judged consistently to be more alike in shape and farther apart in position or location on the graph. Cumulative curves, therefore, should not be used for the communication and analysis of experimental results.

### STUDIES OF DECISION MAKING

Henneman, Reid, and Lloyd, as well as several graduate students, all of the University of Virginia, have research in progress on decision making in complex situations. Under a contract with the Surgeon General of the Army, laboratory experiments are being conducted on behavior believed to be involved in a variety of military situations. Experiments are being carried on to determine the efficiency of decisions in complex task situations with varying kinds and degrees of sequential dependency among successive events, to determine whether variables influencing behavior in a two-choice situation are related in a similar manner to verbal responses that differ in complexity and have been specified in different ways, to discover the influence of irrelevant information on the discrimination of complex visual stimuli, to investigate variables influencing the identification of ambiguous (distorted) visual stimuli, and lastly, an experimental analysis of the variables determining the efficiency of short-term memory for sequentially occurring events marked by heterogeneity, i.e., the interpolation of unlike categories of information.

Bachrach, Banghart, and Pattishall have also been conducting experiments in decision making at the University of Virginia School of Medicine. Their research project consists of a number of parallel experiments under

a contract from the Office of Naval Research. The experiments are concerned with: an investigation of pre-problem set and group pressure on decision making; group structure, anxiety, and efficiency in problem solving; operant conditioning and group-leader interaction; and an analysis of the linguistic structure of verbalization during group problem solving. A report on one aspect of these experiments has been presented at a meeting of the Southern Psychiatric Association

## PHYSIOLOGICAL STUDIES

Bachrach, Gibson, and Johns have noted that pigeons may remain active for 1500 hours with minimal breaks. Their experiment seeks to determine whether the sleep patterns of pigeons are markedly different from those of other animals, or if pigeons do not sleep. By correlating electroencephalographic patterns in pigeons with a cumulative behavior record they hope to arrive at an understanding of the periodicity of sleeping and waking cycles of the pigeon.

Hawks is investigating cutaneous electrical intensity discrimination at the University of Virginia. Comparison with results in experiments involving audition and mechanical vibration has been facilitated. Another of his aims is determining the number of intensity levels which may be used as cues for signaling purposes. A dissertation furnishing complete details of these investigations is now being prepared.

Two physiological studies concerned with vision are anticipated by Kent. In one of these studies the International Commission of Illumination's tristimulus values of negative afterimages will be computed. The second investigation will examine the adaptation of the eye to various colors. A pilot study indicated that chromatic adaptation may be a function of the method by which it is determined. The equality of brightness technique demonstrated chromatic adaptation while it was not shown by flicker photometry. Such data will have potential value in color vision theory.

## STUDIES OF CONDITIONING

Guthrie, of the College of William and Mary, has been carrying out research on the conditioned and unconditioned stimulus time interval using avoidance training on white rats. Dovel and Kent are attempting to obtain higher order conditioning of the human response. Such conditioning was reported in 1935. Since then, however, 12 published experiments have indicated a failure to observe higher order pupillary conditioning. Three years ago a student project at Bridgewater successfully demonstrated the conditioning but lacked satisfactory quantitative measurement.

The present study is using automatically timed high speed photography to record pupil change. It is being performed under a Virginia Academy of Science Research Grant.

## FUTURE RESEARCH TRENDS

By far the greatest number of theoretical investigations treated in the present paper are aspects of learning theory. Even the majority of studies in theory and design correspond closely to interests in learning theory. In view of the importance and prominence of this theory it may be expected that such studies will continue to dominate the field of theoretical academic research. Learning theory originated in the university and, with few exceptions, such research has continued to flow from academic institutions.

Such theoretical unity in research seems healthful, for it suggests that most of the investigations are centered around ideas rather than individuals. Thus, theories are being systematically explored rather than the shifting research interests of individuals pursued. This welding to a supporting framework is also apparent in the applied studies.

In brief, the present writer believes that theoretical and applied research in the departments of psychology in Virginia's colleges and universities is in a healthy and flourishing state, despite the somewhat disparaging comments which were made earlier upon the correspondence of those engaged in such investigations.

— Dell Lebo

## STATISTICS

Seven members of the Department of Statistics, Virginia Polytechnic Institute, attended the Christmas meetings of the American Statistical Association and the Biometric Society, in Chicago. They were Boyd Harshbarger, president of the Biometric Society, Ralph A. Bradley, H. A. David, David Hurst, Rolf Bargmann, William Glenn, and C. W. Cluniès-Ross.

Under a grant from the Ford Foundation, the Department of Statistics, Virginia Polytechnic Institute, is completing the indexing of the *Journal of the American Statistical Association*, Volumes 35 through 50.

Tom Sparks has completed his Ph.D. requirements and has taken a position with DuPont in Wilmington, Delaware. His dissertation was "Significant Tests in Experiments Involving Paired Comparisons."

*Where there's smoke... there's*

**PHILIP MORRIS, INC.**

*The Quality House*

**Marlboro**
**Philip Morris**
**Parliament**
**Benson & Hedges**
**Spud**

Mr. R. J. Taylor joined the Department of Statistics, Virginia Polytechnic Institute, as an assistant professor on January 1, 1959. Mr. Taylor received his B. S. degree from Virginia Polytechnic Institute. He has been working at the National Institute of Health and has obtained a leave of absence to permit him to work on a contract involving reliability.

Charles Quesenberry completed requirements for the Master of Science degree in statistics at Virginia Polytechnic Institute and is currently working on his Ph. D. degree in Statistics.

N. L. Enrick's book "Quality Control," published by The Industrial Press, New York, is scheduled to appear in their edition about the middle of March, 1959. This book deals with the application of statistical methods of control in industry, with examples drawn from metalworking, chemical and textile processing.

— Clyde Y. Kramer

# Virginia Academy of Science

*Program*

OF THE

## Thirty-Seventh Annual Meeting

AT THE UNIVERSITY OF VIRGINIA

CHARLOTTESVILLE, VIRGINIA

May 6, 7, 8, 9, 1959

HOST TO MEETING

## The University of Virginia

# Virginia Academy of Science

## OFFICERS

John C. Forbes, *President*
William M. Hinton, *President-Elect*
Paul M. Patterson, *Secretary*
Foley F. Smith, *Treasurer*
William B. Wartman, *Assistant Secretary-Treasurer*

## COUNCIL

*Elected Members*

Harry G. M. Jopson (1959) Thomas C. Gilmer (1961)
Thelma C. Heatwole (1960) Horton H. Hobbs, Jr. (1962)
Ralph A. Bradley (1963)

*Ex-Officio Members*

Walter S. Flory, Jr. (1959) George W. Jeffers
Edward S. Harlow (1960) Ralph A. Bradley
William G. Guy (1961) Robert T. Brumfield
Charles F. Lane

## LOCAL COMMITTEE ON ARRANGEMENTS

*General Chairman*: Dr. S. P. Maroney, Jr., Department of Biology University of Virginia, Charlottesville, Virginia.

*Housing*: Dr. Jacques Rappaport, *Chairman*,

*Junior Academy*: Dr. Edward Victor, *Chairman*.

*Registration*: Dr. Richard McKinsey, *Chairman*.

*Public Information*: Dr. Kenneth Lloyd, *Chairman*.

*Commercial Exhibits*: Dr. Bartholomeus Van't Riet, *Chairman*.

*Meeting Rooms and Equipment*: Dr. Starling Reid, *Chairman*

## HOST TO MEETING
## THE UNIVERSITY OF VIRGINIA

# General Program Of The 37th Annual Meeting

EXHIBITORS. SECOND FLOOR, NEWCOMB HALL

## WEDNESDAY, MAY 6

5:00 P.M. to 10:00 P.M. — Registration for Junior Academy Members and Participants in the Science Talent Search. Gymnasium.

5:00 P.M. to 10:00 P.M. — Arrangement of Exhibits. Gymnasium.

## THURSDAY, MAY 7

8:00 A.M. to 10:00 P.M. — Registration. South Lobby, Newcomb Hall.

9:00 A.M.—Meeting of Science Exhibit Judges. Gymnasium.
Meeting of Science Talent Search Judges. 4C, Newcomb Hall.

9:30 A.M.—Meeting of Chairmen, Exhibitors, and Science Talent Search Participants. Gymnasium.

10:00 A.M. to 12:15 P.M. and 1:15 to 4:00 P.M. — Finalists of Talent Search Meet with Chairmen and Interviewers. Newcomb Hall 4A, 4B, 4C Board Room, Conference Room.

10:00 A.M. to 12:15 P.M. and 1:15 to 4:00 P.M. — Judging of Science Exhibit Contest. (Encouragement of Juniors at their Exhibits.) Gymnasium.

1:00 P.M. Section of Science Teachers. Peabody 104

2:00 P.M.—Meeting of the Council. South Meeting Room, Newcomb Hall.

4:30 P.M.—Meeting of Section Officers. 4C, Newcomb Hall.

4:30 P.M.—Meeting of Section Editors. Conference Room, Newcomb Hall.

5:30 P.M.—Meeting of Junior Academy of Science Committee, Board Room, Newcomb Hall.

8:00 P.M.—Annual Academy Conference. 11 Monroe Hall.

## FRIDAY, MAY 8

8:30 A.M. to 10:00 P.M. — Registration. South Lobby, Newcomb Hall.

9:00 A.M.–Section Meetings. See the detailed section programs for the time schedule of papers.
*Agricultural Science* – Biology 3.
*Astronomy, Mathematics, and Physics* – Physics, Large Auditorium.
*Bacteriology* – 4A, Newcomb Hall.
*Biology* – South Meeting Room, Newcomb Hall.
*Chemistry* – Peabody 106
*Education* – Peabody 108
*Engineering* – Physics, Small Auditorium.
*Geology* – Peabody 1.
*Medical Science* – Conference Room, Newcomb Hall.
*Psychology* – 4C Newcomb Hall.
*Statistics* – 4B Newcomb Hall.

12:00 Noon to 2:00 P.M. – Virginia Junior Academy of Science Assembly. Ballroom, Newcomb Hall. (See Program of Junior Academy.)

12:15 P.M. to 1:15 P.M. – Recess for Luncheon.

1:30 P.M.–Section Meetings.

5:00 P.M. to 6:00 P.M. – Tea, University of Virginia host, Ballroom, Newcomb Hall.

6:00 P.M. to 8:00 P.M. – Recess for Dinner.

8:00 P.M.–Virginia Academy of Science Assembly. Cabell Hall Auditorium.
Short Business Meeting. Election of Officers.
Presentation of the J. Shelton Horsley Research Award.
*Guest Speaker*: S. I. Gale: *American Cyanamid Company*
*Subject*: "Chemistry on a Cosmic Scale"
The general public is invited to attend.

## SATURDAY, MAY 9

9:00 A.M.–Section Meetings.

10:00 A.M.–Meeting of the Council of the Academy. 4A Newcomb Hall.

# Program Of The Virginia Junior Academy Of Science

## WEDNESDAY, MAY 6

5:00 P.M. to 10:00 P.M. — Registration for Junior Academy Members and Participants in the Science Talent Search. Gymnasium.

5:00 P.M. to 10:00 P.M. — Arrangement of Exhibits. Gymnasium.

## THURSDAY, MAY 7

8:00 A.M. to 10:00 P.M. — Registration. Gymnasium.

9:00 A.M. to 9:30 A.M. — Meeting of Science Exhibit Judges. Gymnasium. Meeting of Talent Search Judges. 4C Newcomb Hall.

9:30 A.M. to 10:00 A.M. — Meeting of Chairmen, Exhibitors, and Science Talent Search Participants. Gymnasium.

10:00 A.M. to 12:15 P.M. — and 1:15 P.M. to 3:00 P.M. — Finalists of Talent Search meet with Chairmen and Interviewers. Newcomb Hall 4A, 4B, 4C, Board Room, Conference Room.

10:00 A.M. to 12:15 P.M. — and 1:15 P.M. to 3:00 P.M. — Judging of Science Exhibit Contest. Gymnasium.

4:00 P.M.—Business Meeting of Virginia Junior Academy of Science. Ballroom, Newcomb Hall.

7:30 P.M.—Discussion Hour: Junior Academy Members and Invited Scientists.

## FRIDAY, MAY 8

9:00 A.M.—Participation in the Senior Academy Section Meetings.

12:00 Noon to 2:00 P.M. — Virginia Academy of Science Assembly and Awards Hour. Ballroom, Newcomb Hall.
*Guest Speaker*: R. N. DuPuis; *Phillip-Morris, Inc.*

# Section Of Agricultural Science

S. S. Obenshain, *Chairman*

Maurice B. Rowe, III, *Vice-Chairman*

Wm. H. Brittingham, *Secretary*

Carl W. Allen, *Section Editor*

FRIDAY, MAY 8, – 8:30 A.M. – BIOLOGY 3

8:30 Call to order by Chairman. Announcements and Committee Appointments.

1. 8:45 A 26-Year Weather Summary at Holland, Virginia.
   D. L. Hallock; *Tidewater Research Station, Virginia Agricultural Experiment Station*

2. 9:00 Some New Cultural Techniques in Strawberry Production in Eastern Virginia.
   M. M. Parker; *Virginia Truck Experiment Station,* Norfolk

3. 9:15 The Development of $F_1$ Spinach Hybrids Adapted to Eastern Virginia.
   E. A. Borchers; *Virginia Truck Experiment Station,* Norfolk

4. 9:30 Some New Aspects of Potato Insect Investigations in Southeastern Virginia.
   R. N. Hofmaster; *Eastern Shore Branch, Virginia Truck Experiment Station,* Painter

5. 9:45 *Guest Speaker*: A. C. Orvedal, Chief, *World Soil Map, Soil Survey Investigations, USDA*
   *Subject*: Engineering Use of Pedological Soils Information.

10:15 Recess

6. 10:30 Rates and Types of Ground Limestone for Alfalfa.
   George D. Jones and W. W. Moschler; *Virginia Agricultural Experiment Station.*

7. 10:45 2, 3, 5 Triphenyl Tetrazolium Chloride as a Quick Test in determining Viability of small Grain seeds.
   T. G. Copeland, Jr., and C. F. Bruce; *Division of Plant Industry, Virginia Department of Agriculture*

8. 11:00 *Guest Speaker*: W. L. Hill, *Fertilizer Materials Section, Soil and Water Conservation Research Division*
*Subject*: Trends in Fertilizer Technology.

9. 11:30 Woodchucks: A Major Agricultural Pest in Virginia.
John C. Jones; *Fish and Wildlife Service, U. S. Department of Interior*

11:50 Adjourn for Lunch

10. 1:15 Nutritional Status of Rural Haitians.
K. W. King and G. L. Brinkman; *Virginia Agricultural Experiment Station*

11. 1:30 Purification of a Growth Factor found in Meat Meal.
Paul Lepore and C. J. Ackerman; *Virginia Agricultural Experiment Station*

12. 1:45 The Influence of Dominance Rank on Sexual Activity of Chickens.
P. B. Siegal; *Virginia Agricultural Experiment Station*

13. 2:00 The Use of equine Gonadotrophins in increasing reproductive Performance of Ewes.
G. H. Kiracofe and J. W. Gossett; *Virginia Agricultural Experiment Station*

14. 2:15 The Effect of Certain Feed Additives and Feed Preparations for Fattening Feeder Lambs.
H. A. Hopkins, J. P. Fontenot, W. M. Mestanza, and J. S. Copenhaver; *Virginia Agricultural Experiment Station*

15. 2:30 Cell Divisions in Wool Follicles and the Chromatin Reaction in the Skin of Sheep throughout the Seasons.
Lubow A. Margolena; Animal Husbandry Department, *U. S. Department of Agriculture*, Beltsville, Md.

2:45 Recess

16. 3:00 Use of Electronic Data Computing Methods to analyze the Basic Survey of Virginia Dairying.
Robert F. Hutcheson; *Division of Markets, Virginia Department of Agriculture*

17. 3:15 The Economics of feeding Grain to Milking Cows on Pasture.
W. A. Hardinson and G. C. Graf; *Virginia Agricultural Experiment Station*

18. 3:30 Progress Report on Research on Dwarfism in Beef Cattle.
Thomas J. Marlowe; *Virginia Agricultural Experiment Station*

19. 3:45 Preliminary Investigation of the Fermentation of Uniformly Labelled $C^{14}$-glucose by Rumen Microorganisms.
J. H. Newman and W. E. C. Moore; *Virginia Agricultural Experiment Station*

20. 4:00 The Effects of Implanting Different Levels of Stilbestrol in Grazing Beef Steers.
J. P. Fontenot, R. F Kelly, and J. A. Gaines; *Virginia Agricultural Experiment Station*

21. 4:15 Effects of Selected Physical and Economic Variables on Prices of Calves in Virginia Feeder Calf Sales.
K. C. Williamson, R. C. Carter, G. W. Litton, J. D. Johnson, and G. A. Gaines; *Virginia Agricultural Experiment Station*

4:30 Business Session

## Section Of
## Astronomy, Mathematics, And Physics

J. J. Taylor, *Chairman*

Robert C. Yates, *Secretary*

Irving G. Foster, *Section Editor*

FRIDAY, MAY 8, 1959 — 9:00 A.M. LARGE AUDITORIUM, PHYSICS

9:00 Announcements and Remarks by the Chairman.

1. 9:10 Equilibrium Ultracentrifuge.
C. E. Williams, R. D. Boyle, and J. W. Beams; *University of Virginia*

2. 9:25 Yield of Fast Photoneutrons from Heavy Elements.
G. C. Reinhardt and L. B. Aull; *University of Virginia*

3. 9:40 Photoproton Yields from Light Elements.
D. C. Worth and G. Haste; *University of Virginia*

4. 9:55 Angular Distribution of 14-Mev Neutrons Scattered by Light Elements.
B. C. Groseclose, R. F. Stetson, and W. W. Walker; *University of Virginia*

5. 10:10 Demonstrations of Parity Conservation.
F. L. Hereford and J. S. Plaskett; *University of Virginia*

6. 10:30 A Precision 0 to 20 amp Magnet Current Control.
M. A. Chramiec and C. D. Bond; *Virginia Polytechnic Institute*

7. 10:45 A Water-Moderated Natural Uranium Sub-Critical Reactor.
T. H. Row and Andrew Robeson; *Virginia Polytechnic Institute*

8. 11:00 Observation of the Decay of Absorbed Barium-133 in the Field Emission Microscope.
William C. Saunder; *Virginia Military Institute*

9. 11:15 Divisibility Testing.
Herta T. Freitag; *Hollins College*, and Arthur H. Freitag; *Jefferson High School*

10. 11:35 Some Aspects of Terminal Ballistics.
Robert L. Kernell; *College of William and Mary*

11:50 Business meeting

12:15-1:15 Luncheon Recess.

11. 1:20 Curvatures of $r^n = \cos n\theta$.
Robert C. Yates; *College of William and Mary*

12. 1:40 Probability for High School Students.
Beatrice A. Harrington; *Maggie L. Walker High School*

13. 1:55 A Laboratory for Liberal Arts Physics.
J. L. McKnight; *College of William and Mary*

14. 2:15 Historical and Philosophical Experiments in Elementary Physics.
Richard H. Prosl; *College of William and Mary*

15. 2:30 The Junior Instructorship Program at William and Mary.
R. C. Yates, Garrett Etgen, and Richard H. Prosl; *College of William and Mary*

16. 2:50 Experiments for Advanced Undergraduates.
W. D. Whitehead; *University of Virginia*

17. 3:05 An Apparatus for the Measurement of the Range of Alpha Particles in Air.

J. W. Little; *College of William and Mary*

18. 3:20 An Intermediate Laboratory Experiment on Rutherford Scattering of Alpha Particles.
E. T. Gerry; *College of William and Mary*

19. 3:30 An Analog Computer Used in Reactor Simulation.
William S. Baber and Andrew Robeson; *Virginia Polytechnic Institute*

20. 3:50 Simultaneous Photoelectric Effect of Two Electrons.
F. R. Crownfield, Jr.; *College of William and Mary*

Alternates

Unfamiliar Facts Concerning Thermoelectricity.
L. G. Hoxton; *University of Virginia*

Electrical Conduction in Magnetic Thin Films. I — Theoretical.
B. W. Sloope and A. D. Campbell; *University of Richmond*

Electrical Conduction in Magnetic Thin Films. II — Experimental.
A. D. Campbell, J. F. Garren, Jr., A. C. Hudgins, Jr., and B. W. Sloope; *University of Richmond*

Surface Deformation of Cooper Monocrystals at High Temperatures.
John M. Bailey; *University of Virginia*

SATURDAY, MAY 9, 1959 — 9:00 A.M.

21. 9:00 Motions and Absolute Magnitudes of Mira Type Stars.
H. L. Alden and V. Osvalds; *L. McCormick Observatory* and A. Marguerite Risley; *Randolph-Macon Woman's College*

22. 9:25 Oscillation Theorems for Difference Equations.
J. S. Plaskett; *University of Virginia*

23. 9:40 Mechanical Properties of Whiskers.
M. J. Skove; *University of Virginia*

24. 9:55 Conductibility of Metallic Whiskers at Low Temperatures.
E. P. Stillwell; *University of Virginia*

25. 10:10 Piezoresistance Effect at Very High Elastic Strains in Metallic Whiskers.
H. H. Hobbs; *University of Virginia*

26. 10:25 Positron Lifetime in Water and Ice.
W. W. Walker and W. S. Walker; *University of Virginia*

27. 10:40 Possible Effects of Centrifugal Fields on Radioactive Lifetimes.
W. Tucker; *University of Virginia*

28. 10:55 Mechanical Strength of Thin Films of Metal.
H. H. Pattillo and C. J. Lowman; *University of Virginia*

29. 11:10 Elastic Scattering of 2 to 4 Mev Polarized Neutrons.
W. P. Bucher, W. B. Beverly, and G. C. Cobb; *University of Virginia*

30. 11:30 Recent High Pressure Investigations of Solidified Gases at Low Temperature.
John W. Stewart and Robert F. Patterson; *University of Virginia*

31. 11:50 The Surface Structure of growing Crystals.
N. Calvera; *University of Virginia*

## Section Of Bacteriology

(*Virginia Branch, Society of American Bacteriologists*)

Miles Hench, *President*

Quentin Myrvik, *Vice-President*

Catherine M. Russell, *Secretary*

P. Arne Hansen, *Section Editor*

FRIDAY, MAY 8, 1959 – NEWCOMB HALL, 4A

11:00 A.M. Business Meeting

12:00 NOON Adjourn

2:00 P.M. Presentation of Scientific Papers.

2:00 P.M. The Enzymatic Formation of Arabinose-5-Phosphate.
Wesley A. Volk; *Department of Microbiology, University of Virginia School of Medicine*

2:20 P.M. A Comparative Study of Media for the Detection of Enterococci in Water.
R. Travis Hill; *State Department of Health Laboratory*, Richmond

2:40 P.M. Listeria Meningitis — Is It Rare?
H. J. Welshimer; *Department of Microbiology, Medical College of Virginia*

3:00 P.M. Serum Lysozyme Levels in Rabbits undergoing a Generalized Granulomatous Reaction.
Quentin N. Myrvik and Eva Soto Leake; *Department of Microbiology, University of Virginia School of Medicine*

3:20 P.M. Reduction of Potassium Tellurite by *Streptococcus bovis.*
Margaret Carlson and P. Arne Hansen; *Department of Microbiology, University of Maryland,* College Park

3:40 P.M. Observations on the Effect of Carbon Dioxide on the Growth of *Entamoeba histolytica.*
E. Clifford Nelson and Muriel M. Jones; *Department of Microbiology, Medical College of Virginia*

## Section Of Biology

William W. Scott, *Chairman*

Jesse C. Thompson, Jr.; *Secretary*

Walter S. Flory, Jr.; *Section Editor*

FRIDAY, MAY 8 — 9:00 A.M. — SOUTH MEETING ROOM NEWCOMB HALL

1. 9:00 Experimental Evocation of Differentiation of Chick Melanocytes.
Willie M. Reams, Jr. and Stuart E. Nichols, Jr.; *Medical College of Virginia*

2. 9:15 Serosal Melanocytes in the Pet Mouse.
Stuart E. Nichols, Jr. and Willie M. Reams, Jr.; *Medical College of Virginia*

3. 9:30 Techniques with a Mierorespirometer.
Jack D. Burke; *University of Richmond*

4. 9:45 The Effect of Propylthiouracil on Gross Weights of Thyroid Ovaries, and Adrenals of the Albino Rat.
Iris B. Hadden and W. L. Mengebier; *Madison College.*

5. 10:00 Tissue Ergothioneine.
Kamal Yackzan; *University of Richmond*

6. 10:15 A Comparative Study of Vertebrate Embryonic Serum Proteins.
Edwin M. Weller; *Randolph-Macon Woman's College*

7. 10:30 Action of Iproniazid on *Tetrahymena pyriformis.*
Joseph Krezanoski; *Medical College of Virginia*

8. 10:45 Studies on the Control of Growth in Timothy Roots.
Robert T. Brumfield; *Longwood College* and *Oak Ridge National Laboratory*

9. 11:00 A Comparison of Initial Effects from Gamma Radiation upon Some Gymnosperms and Angiosperms.
W. S. Flory and W. Ralph Singleton; *The Blandy Experimental Farm, University of Virginia.*

10. 11:15 Embryological Evidence for the Relationship of Aquifoliaceae to Celastraceae.
J. M. Herr, Jr.; *Pfeiffer College*

11. 11:30 Ground Vegetation Patterns of the Spruce-fir Area of the Great Smoky Mountains National Park
Dorothy L. Crandall; *Randolph-Macon Woman's College*

12. 11:45 The Controversial Sex-bivalent in the Golden Hamster.
Lyman R. Emmons; *University of Virginia*

13. 12:00 The Chromosomes of Several *Zephyranthes* Species from the West Indies.
W. S. Flory, Jr.; *The Blandy Experimental Farm, University of Virginia*

14. 12:15 A Study of Phylogeny and of Karyotype Evolution in *Lycoris.*
Smritimoy Bose; *The Blandy Experimental Farm, University of Virginia*

15. 12:30 Experimental Infections of Chick Embryos with *Tetrahymena pyriformis.*
Jesse C. Thompson, Jr., Lynne Santy, and Valer Clark; *Hollins College*

12:45 Section Business Meeting.

16. 2:00 Invitation Paper. Plant Migrations in Mid-Appalachian Region.
E. L. Core; *West Virginia University*

17. 2:45 Virginia Flora.
A. B. Massey; *Virginia Polytechnic Institute*

18. 3:00 Notes on the Helminths of Mammals in the Mountain Lake

Region — The Helminths of Rabbits.
Harry L. Holloway; *Roanoke College*

19. 3:15 Evaluation of Rabbit Management Methods by Live Trapping.
Donald K. Fortenbery; *Virginia Polytechnic Institute*

20. 3:30 Techniques Involved in the Use of Chemicals for Establishing Wildlife Clearings.
Harold A. Trumbo; *Virginia Polytechnic Institute*

21. 3:45 Effect of Forestry Practices and Wildlife Management on Abundance and Distribution of Deer.
John H. Quillen, Jr.; *Virginia Polytechnic Institute*

22. 4:00 Incidence and Causes of Tularemia in Humans in Virginia.
Burd S. McGinnes; *Virginia Cooperative Wildlife Research Unit, Virginia Polytechnic Institute*

23. 4:15 The Effect of Blackbirds upon Agriculture in Southeastern Virginia.
Thomas C. Crebbs, Jr.; *Virginia Polytechnic Institute*

24. 4:30 The Stomach Contents of *Rana catesbeiana* Shaw as Correlated with Different Pond Environments.
Garnett R. Brooks, Jr.; *University of Richmond*

25. 4:45 The Food of the Chain Pickerel *Esox niger* LeSueur in Tuckahoe Creek.
David A. Felmer; *University of Richmond*

26. 5:00 Respiration and Hemolysis of Ultraviolet Irradiated Frog Erythrocytes.
Lewis Harvie and S. P. Maroney, Jr.; *University of Virginia*

27. 5:10 Observations on the Biology of *Pelomyxa palustris* Greef Collected under polysaporbic Conditions.
Daniel H. Stern; *University of Richmond*

28. 5:20 Studies on Tardigrades from Virginia.
G. T. Riggin, Jr.; *Virginia Polytechnic Institute*

# Section Of Chemistry

Frank A. Vingiello, *Chairman*

Mearl A. Kise, *Secretary*

Mearl A. Kise, *Section Editor*

FRIDAY, MAY 8 — 9:00 A.M. — PEABODY 106

9:00 Announcements; Introductory Remarks

1. 9:15 The Effect of Foreign Metals on the Corrosion of Titanium in Boiling 2M Hydrochloric Acid.
W. Roger Buck, III, Billy Sloope and Henry Leidheiser, Jr.; *Virginia Institute for Scientific Research*

2. 9:30 Oxidative Studies of Dipyridylamines.
Robert N. Lawhorn, Ertle Thompson, Oscar Rodig and James W. Cole, Jr.; *Department of Chemistry, University of Virginia*

3. 9:45 N-Substituted *L*- Amino Nitriles.
L. Neelakantan; *Department of Chemistry and Pharmaceutical Chemistry, Medical College of Virginia*

4. 10:00 Quantitative Microanalysis of Alkoxy Groups.
Robert E. Bailey and Bryant Harrell; *Department of Chemistry, College of William and Mary*

5. 10:15 A Study of the Structure of Nitryl Chloride.
John C. Kotz and Richard P. Carter; *Chemistry Department, Washington and Lee University*

6. 10:30 Synthetic Homologs of *L*-Amino Acids and Their Derivatives as Anti-Tumor Agents.
John Andrako, J. Doyle Smith and W. H. Hartung; *Department of Chemistry and Pharmaceutical Chemistry, Medical College of Virginia*

7. 10:45 Selected Addition Complexes of Nitryl Chloride.
Richard P. Carter and John C. Kotz; *Chemistry Department, Washington and Lee University*

8. 11:00 The Infra-red Absorption of Phosphorus Compounds.
Margaret Anne Barber; *Research Department, Virginia-Carolina Chemical Corporation*

9. 11:15 Specific Centers in Palladium Catalysts.
Robert L. Beamer and Walter H. Hartung; *Department of Chemistry and Pharmaceutical Chemistry, Medical College of Virginia*

10. 11:30 Research in Cancer Chemotherapy.
John E. Yurko and Bryant Harrell; *Department of Chemistry, College of William and Mary*

11:45 Business Meeting

11. 1:00 Recent Electron and Optical Micrographs of a Catalyst Surface.
Allan T. Gwathmey; *Cobb Chemical Laboratory, Department of Chemistry;* Shaukt Azim; *Department of Chemical Engineering, University of Virginia*

12. 1:15 Electron Microscope Observations on the Decomposition of Molybdenum Trioxide and Cuprous Oxide.
Kenneth R. Lawless; *Cobb Chemical Laboratory, Department of Chemistry, University of Virginia*

13. 1:30 Carotenoid Pigments of Aged Burley Tobacco.
H. E. Wright, Jr., W. W. Burton and R. C. Berry, Jr.; *Department of Research and Development, The American Tobacco Company*

14. 1:45 Qualitative Elementary Analysis of Organic Compounds by a Combustion Method.
Frank Denaro and Bryant Harrell; *Department of Chemistry, College of William and Mary*

15. 2:00 A Study of the Acid Catalyzed Cleavage of 10-Cyclohexyl-1, 2-Benzanthracene.
F. A. Vingiello and T. Delia; *Chemistry Department, Virginia Polytechnic Institute*

16. 2:15 Surface Tension, Intermolecular Distance and Association Energy of a Pure Non-Polar Liquid.
Ralph G. Steinhardt, Jr.; *Department of Chemistry, Hollins College*

17. 2:30 Some Colorless Polyenes of Aged Burley Tobacco.
H. E. Wright, Jr., W. W. Burton and R. C. Berry, Jr.; *Department of Research and Development, The American Tobacco Company*

18. 2:45 Proof of Structure of 4-Hydroxy-2-methyltetrahydrothiophene 1, 1-Dioxide.

Robert C. Krug and James A. Rigney; *Department of Chemistry, Virginia Polytechnic Institute*

19. 3:00 Inhibition of the Nitrostyrene Condensation in Acetic Acid by Traces of Water.
Charles E. Bell, Jr., and Thomas I. Crowell; *Cobb Chemical Laboratory, University of Virginia*

20. 3:15 Quantitative Separation of Some Pyridine Compounds by Paper Chromatography.
Eugene Glock and T. H. Vaughan, Jr.; *Department of Research and Development, The American Tobacco Company*

21. 3:30 The Preparation of a 10-(Hydroxymethylphenyl)-1, 2-Benzanthracene.
F. A. Vingiello and C. Lewis; *Chemistry Department, Virginia Polytechnic Institute*

22. 3:45 Kinetics in a Dual Temperature System.
Thomas I. Crowell; *Cobb Chemical Laboratory, University of Virginia*

23. 4:00 An Investigation of Three Derivatives of Chromotropic Acid as Possible Colorimetric Reagents for the Simultaneous Determination of Uranium and Thorium.
H. Perry Holcomb and John H. Yoe; *Pratt Trace Analysis Laboratory, Department of Chemistry, University of Virginia*

24. 4:15 Color Reactions of 1, 4-Dihydroxyanthraquinones.
E. Guy Owens II; *Pratt Trace Analysis Laboratory, Department of Chemistry, University of Virginia*

25. 4:30 Spectrophotometric Determination of Manganese (II).
Dwight O. Miller; *Pratt Trace Analysis Laboratory, Department of Chemistry, University of Virginia*

26. 4:45 Spectrochemical Determination of Trace Amounts of Nickel in Normal Human Plasma and Red Blood Cells.
Leonel M. Paixao; *Pratt Trace Analysis Laboratory, Department of Chemistry, University of Virginia*

27. 5:00 Some Observations of Crystal Imperfections during Oxidation and Catalytic Reaction on Copper.
R. H. Kean; *Cobb Chemical Laboratory, Department of Chemistry, University of Virginia*

# Education Section

Charles J. Turner, *Chairman*

George W. Kent, *Secretary*

James B. Patton, *Section Editor*

FRIDAY, MAY 8, 1939 – 9:00 A.M. – PEABODY 108

1. 9:00 The Relation between ACE Scores and Academic Success in College.
   A. L. Wingo; *State Department of Education*

2. 9:15 Socio-psychological Factors in the Development of Children's Interest.
   Judith Hollen; *Bridgewater College*

3. 9:30 A Study of Teacher Evaluation in College.
   Donald Banks; *Bridgewater College*

4. 9:45 Where Do College Teachers Come From?
   W. D. Clague; *Bridgewater College*

5. 10:00 Symposium: Relative Merits of Laboratory *vs.* Demonstration in the Teaching of Science.
   A. L. Wingo, *Moderator*
   Earl Savage, *Science Coordinator, Richmond Public Schools* Richmond
   Sydney S. Negus; *Medical College of Virginia*
   Franklin D. Kiser; *Assistant Supervisor of Public Education – Science*
   Richard Irby; *Leader, Physical Chemistry Section, Department of Research and Development, American Tobacco Company*

6. 10:45 Business Meeting.

# Section Of Engineering

B. A. Niemeier, *Chairman*

O. R. Singleton, Jr.; *Secretary*

R. M. Hubbard, *Section Editor*

FRIDAY, MAY 8 — 9:10 A.M. — PHYSICS, SMALL AUDITORIUM

9:10 The Electrometer Measurement of Very Low Ion Densities in Gases.
Robert L. Ramsey and Robert L. Overstreet; *Department of Electrical Engineering, University of Virginia*

9:30 Research in Continuously Reinforced Concrete Pavements.
Howard Newlon, Jr.; *Virginia Council of Highway Investigation and Research, University of Virginia*

9:50 Theoretical Analysis of Torsion in Skewed Bridges
William Zuk; *Department of Civil Engineering, University of Virginia*

10:10 The Effect of Mechanical Vibration on Liquid Film Heat Transfer Coefficients.
Dennis M. Frame; *School of Engineering, University of Virginia*

10:30 Heat Transfer in a Hot Water Storage Heater
Robert M. Hubbard and Edward J. Leech; *Department of Chemical Engineering, University of Virginia*

10:50 Break

11:00 Hypersonic Stability of Three Fundamental Missile Nose Configurations.
E. B. Pritchard; *Aeronautical Engineering Department, Virginia Polytechnic Institute*

11:20 The Applicability of Sandwich Type Structures for Missile Construction.
E. B. Pritchard and J. S. Pratt; *Aeronautical Engineering Department, Virginia Polytechnic Institute*

11:40 On the Optimization of Missile Trajectories.
J. E. Eades, Jr., J. N. Perkins, and R. B. Richards; *Aeronautical Engineering Department, Virginia Polytechnic Institute*

12:00 Presentation of Engineering award at the meeting of the Junior Academy of Science

2:00 On the Problem of Earth Satellites.
J. B. Eades, Jr., and R. N. Bell; *Aeronautical Engineering Department, Virginia Polytechnic Institute*

2:20 Boundary Layer Control by Magnetoaerodynamic Techniques.
R. W. Truitt and C. M. Jackson, Jr.; *Aeronautical Engineering Department, Virginia Polytechnic Institute*

2:40 Effects of Compressibility in Magnetoaerodynamics.
R. W. Truitt and L. B. Callis; *Aeronautical Engineering Department, Virginia Polytechnic Institute*

3:00 Break

3:10 The Fundamentals of Gaseous Diffusion Applied to a System of Hydrogen and Carbon Dioxide.
Russell A. Primrose; *Chemical Engineering Department, Virginia Polytechnic Institute*

3:25 The Design Construction and Operation of a Heat Exchanger for a Moving Bed Hypersorption Process.
William A. Barkley and Stuart B. Row; *Chemical Engineering Department, Virginia Polytechnic Institute*

3:40 Factors Affecting Mass Transfers in a Mixer-Settler Extractor.
G. E. Brown, N. C. M. Landis, and Dr. F. W. Bull; *Chemical Engineering Department, Virginia Polytechnic Institute*

4:10 Electrolytic Recovery of Caustic and Acid from Pulp Waste with Ion Exchange Membranes.
E. J. Holberg and N. F. Murphy; *Chemical Engineering Department, Virginia Polytechnic Institute*

4:30 Engineering Exhibits
Presented by members of the Virginia Junior Academy of Science

5:30 Business Meeting and Election of officers

SATURDAY, MAY 9 – 9:00 A.M. – PHYSICS, SMALL AUDITORIUM

9:00 General Description of the University of Virginia Nuclear Reactor.
Lawrence R. Quarles; *School of Nuclear Engineering, University of Virginia*

9:20 Inherent Safety of the Swimming Pool Type Nuclear Reactor.
J. Lawrence Meem; *Department of Electrical Engineering, University of Virginia*

9:40 Hazards Analysis for the University of Virginia Nuclear Reactor.

Walter P. Walker; *Department of Nuclear Engineering, University of Virginia*

10:10 Shielding of the University of Virginia Nuclear Reactor.
W. Reed Johnson; *Department of Nuclear Engineering, University of Virginia*

10:30 Heat Transfer in the University of Virginia Nuclear Reactor.
F. Anthony Iachetta; *Department of Mechanical Engineering, University of Virginia*

10:50 Study of the Fission Product Activity in the Gas Stream of a Gas Cooled Nuclear Reactor.
David D. Wallace; *School of Engineering, University of Virginia*

11:10 An Analog for Study Temperature Control in Jacketed Chemical Reaction Vessels.
William B. Cashion; *School of Engineering, University of Virginia*

11:25 Fluidized Conveying of Solids.
Elmer F. Zurn; *School of Engineering, University of Virginia*

11:40 Volumetric Heat Transfer Coefficient in a Parallel-flow Spray Dryer.
Everett L. Plyler; *School of Engineering, University of Virginia*

12:05 Equilibrium Relationships in the System $CO_2$ — Methylene Chloride.
John W. Eldridge and Donald S. Buell; *Department of Chemical Engineering, University of Virginia*

12:20 Catalytic Studies on Surfaces of Single Crystals of Nickel-Copper Alloys.
Edwin Cox, Otis L. Updike, and Allan T. Gwathmey; *Department of Chemical Engineering* and *Chemistry, University of Virgina*

## Section Of Geology

J. T. Hack, *Chairman*
J. L. Calver, *Vice-Chairman*
R. S. Mitchell, *Secretary*
B. W. Nelson, *Section Editor*

FRIDAY, MAY 8, — 9:00 A.M. — PEABODY I

9:00 Announcements

1. 9:10 Ground-Water Resources in Western Albemarle County, Virginia
Whitman Cross, II; *University of Virginia*

2. 9:30 Garnet Deposits of the Virginia Piedmont.
C. W. Crist, Jr.; *University of Virginia*

3. 9:45 A Discussion of Iron Oxide Pseudomorphs after Pyrite Metacrysts in the Piedmont Schists of Virginia.
R. K. Peare; *University of Virginia*

4. 10:00 The Geology of the Piedmont Physiographic Provinces of Virginia as Applied to Highway Engineering.
W. T. Parrott; *Virginia Department of Highways*

5. 10:20 Highway Engineering in Virginia by Photogrammetric Methods.
F. B. Bales; *Virginia Department of Highways.*

6. 10:35 Metamorphic Features of the Black Hills Area, South Dakota.
J. A. Redden; *Virginia Polytechnic Institute*

7. 10:50 The Dore Lake Complex: A Metamorphosed Layered Complex (Chibougamau District, Quebec).
G. O. Allard; *University of Virginia*

8. 11:10 Crystallization Temperature of Anorthosite, Nelson and Amherst Counties, Virginia.
D. N. Hillhouse; *Virginia Polytechnic Institute*

9. 11:25 Cretaceous and Triassic Clay Minerals of Pamunkey River Basin.
J. R. Kreglo; *Virginia Polytechnic Institute*

10. 11:40 Some Unusual Clay Minerals from Pennsylvanian Undershales.
B. W. Nelson; *Virginia Polytechnic Institute*

12:00 Recess

11. 2:00 Mineral Indicators of Environment in Parts of the Coastal Plain Sediments of Maryland.
Dorothy Carroll; *United States Geological Survey*

12. 2:15 Unusual Speliothems from Walker Mountain Cave.
J. F. Quinlan; *Virginia Polytechnic Institute*

13. 2:30 Age and Fauna of Huntersville Formation, Tannersville Area, Virginia.
P. C. Ciaramella; *Virginia Polytechnic Institute*

14. 2:45 Celestite and Strontianite from Wise County, Virginia.
R. F. Pharr and R. S. Mitchell; *University of Virginia*

15. 3:00 A Description of the Concretions Found in the Millboro Black Shales of Virginia.
C. E. Roberts and G. T. Farmer, Jr.; *University of Virginia*

16. 3:15 Basal Conglomerate of Mosheim Limestone, Chatham Hill, Virginia.
F. Webb; *Virginia Polytechnic Institute*

17. 3:30 Faults and Fault Breccias of the Blacksburg-Shawsville Area.
J. B. Deaton; *Virginia Polytechnic Institute*

18. 3:45 Upper Mississippian Sedimentary Structures in the Bluefield Area.
W. A. Thomas; *Virginia Polytechnic Institute*

19. 4:00 Structure of the Kent Window Area.
F. Marshall; *Virginia Polytechnic Institute*

20. 4:15 Glaciological Measurements on the Ross Ice Shelf.
W. W. Boyd, Jr.; *University of Virginia*

4:30 Business Meeting

## Section Of Medical Science

Robert H. Brownson, *Chairman*

E. W. Pullen, *Secretary*

W. Parker Anslow, Jr., *Section Editor*

FRIDAY, MAY 8, 1959 — 10:00 A.M. — CONFERENCE ROOM, NEWCOMB HALL

1. 10:00 Effect of Insulin on Glucose Utilization by Frog Skeletal Muscle *in vitro*.
D. R. H. Gourley; *University of Virginia School of Medicine*

2. 10:15 The Production of Hemorrhagic Irreversible Shock in the Cat.
Eugene D. Brand; *University of Virginia School of Medicine*

3. 10:30 An Interspecific Study of Per Cent Fatness and of Water Content of the Fat-Free Body.
Grover C. Pitts; *University of Virginia School of Medicine*

4. 10:45 Metabolic Studies on Frog Skin Epithelium and Epithelium Homogenate.

Leif Skjelkvale, Kathryn Nieder and Ernst G. Huf; *Medical College of Virginia*

5. 11:00 Urinary Bladder Response in the Cat to Stimulation of the Thalamus, Hypothalamus, Basal Ganglia and Other Forebrain Structures.
Everett H. Ingersoll, Louise L. Jones and Erling S. Hegre; *Medical College of Virginia*

6. 11:15 The Effect of Exposure to Cold on the Response to Alcohol Intoxication of Rats Which are Deficient in Tryptophan and Niacin.
J. C. Forbes and G. M. Duncan; *Medical College of Virginia*

7. 11:30 A Study of the Development of the Sacrococcygeal Region of Human Embryos and Fetuses.
James E. Kindred; *University of Virginia School of Medicine*

8. 11:45 Hypothermia in Thyroidectomized Rats.
Chalmers L. Gemmill; *University of Virginia School of Medicine*

12:00 Business Meeting

9. 2:15 Experimentally produced Regeneration of Adult Frog Limbs.
Theodore I. Malinin; *University of Virginia School of Medicine*

10. 2:30 Clinical and Experimental Studies on Nephrosis.
Cornelia Hoch-Ligeti; *University of Virginia School of Medicine*

11. 2:45 X-Irradiation of Rat Central Nervous System.
Robert H. Brownson; *Medical College of Virginia*

12. 3:00 Ovarian Pregnancy.
Bernard A. Heckman and Delilah A. Little (Introduced by James E. Kindred); *University of Virginia School of Medicine*

13. 3:10 Anomalies of the Umbilical Cord in Human Embryos and Fetuses.
Burton D. Goodwin and William M. Runkle (Introduced by James E. Kindred); *University of Virginia School of Medicine*

14. 3:20 Human Monster with Abnormal Development of the Amnion.
David S. O'Brien and Charles L. Gaudry, Jr. (Introduced by James E. Kindred); *University of Virginia School of Medicine*

15. 3:30 Description of Full Term Male "Siamese" Twins of the Thoracopagus Type.
James H. Carraway; Maurice J. O'Connell (Introduced by James E. Kindred); *University of Virginia School of Medicine*

16. 3:40 Dissection of a Human Craniopagus Parietalis.
Robert B. Moore and Arthur H. Wasser (Introduced by James E. Kindred); *University of Virginia School of Medicine*

17. 3:50 Description of a Human Full Term Cyclops.
Louis J. Elsas and John T. Hitchens (Introduced by James E. Kindred); *University of Virginia School of Medicine*

18. 4:00 Anomalies of Kidneys of Human Embryos and Fetuses.
Edwin L. Lyons, Robert K. Maddock, Jr., and Alan D. Rosenthal (Introduced by James E. Kindred); *University of Virginia School of Medicine*

19. 4:10 Absorption, Distribution, and Excretion of Methocarbamol.
Leah L. Eubank, Frances K. Coles, Addison D. Campbell and Ernst G. Huf; *Medical College of Virginia*

## Section Of Psychology

Merton E. Carver, *Chairman*

Richard H. Henneman, *Executive Committeeman*

Penelope Lewis, *Secretary-Treasurer*

Cyril R. Mill, *Section Editor*

FRIDAY MORNING, MAY 8, — 10:00 A.M. — NEWCOMB HALL 4C

Kenneth E. Lloyd, *Session Chairman*

1. 10:00 Painless Electrical Cutaneous Stimulation.
Robert H. Gibson; *University of Virginia*

2. 10:15 An Investigation of Short Term Memory.
John B. Feallock; *University of Virginia*

3. 10:30 The Inter-Trial Interval in Avoidance Training.
Raymond H. Kirby; *College of William and Mary*

4. 10:45 Partial Recognition, Word Frequency, and Responses Bias.
William F. Hawkins; *University of Virginia*

5. 11:00 Attitudes of Parents and Educators toward Sex Instruction in Public Schools.
Cyril R. Mill; *Department of Mental Hygiene and Hospitals*

6. 11:15 Panel Discussion: The Miami Conference on Graduate Education in Psychology.
*Moderators* Frank W. Finger; *University of Virginia*

7. 12:30 Lunch

John F. Hahn, *Session Chairman*

8. 2:00 Non-sexual Behaviors Induced by an Estrogen.
Robert L. Rhyne; *University of Virginia*

9. 2:15 A Modification of the Iowa Picture Interpretation Test.
David Rice; *College of William and Mary*

10. 2:30 A Second Report on Achievement Imagery and ACE Scores as Predictors of Grades in General Psychology.
John E. Williams; *University of Richmond*

11. 2:45 The Effects of Failure and Achievement Imagery on Arithmetic Performance.
Robert A. Johnson; *University of Richmond*

12. 3:00 Humans in a Puzzle Box.
Peter Guthrie and Henry Schwartz; *College of William and Mary*

13. 3:15 AF: A New approach to the Concept of Achievement.
Robert M. Roth, and Jean Gilbert; *Hampton Institute*

14. 3:30 Discussion: Implications of the National Defense Education Act for Psychologists

15. 4:30 Business Meeting.

16. 5:30 Social Hour and Dinner at The Steak House

SATURDAY, MAY 9 — 9:00 A.M. — NEWCOMB HALL

Robert A. Johnston, *Session Chairman*

17. 9:00 The Reinforcement Variable in Verbal Operant Conditioning.
Richard DeWilde; *College of William and Mary*

18. 9:15 The "Doctor of Psychology" as a Professional Degree.
Dell Lebo and Leland W. Calvin; *Richmond Professional Institute*

19. 9:30 Differential Drug Effects on Schedules of Reinforcement in the Pigeon.
Arthur J. Bachrach and Janice Gibson; *University of Virginia School of Medicine*

20. 9:45 The Perception of Form in the Peripheral Retina.
William B. Camm; *College of William and Mary*

21. 10:00 Drinking Behavior as a Function of Saline Injections and Water Deprivation.
James F. Campbell, Jr.; *University of Virginia*

22. 10:15 The Present Status of Recorded Sound Stimuli Association Tests
Dell Lebo and Roselyn Sherman Bruce; *Richmond Professional Institute*

23. 10:30 A Comparison of Science and Non-Science Students on the Morgan Test of Logical Reasoning.
Fred K. McCoy; *University of Richmond*

## CONCURRENT SESSION

### SATURDAY, MAY 9 — 9:00 A.M. — NEWCOMB HALL

William F. Battig, *Session Chairman*

24. 9:00 A Discussion of the Concepts of Play.
Jacob Silverberg; *Department of Mental Hygiene and Hospitals*

25. 9:15 Nine Years of Diagnosis and Treatment at the Lynchburg College Reading Center.
William D. Brown and Louann Bolden; *Lynchburg College*

26. 9:30 Detection and Recognition of Non-uniform Visual Targets.
E. Ray Harcum; *College of William and Mary*

27. 9:45 The Lowry Reasoning Test Combination as a Status — Free Device for a Personnel Selection Problem.
R. S. Andrews; *QM Field Evaluation Agency*,
R. O. Lucier; *Courtney and Co.*, and
Dell Lebo; *Richmond Professional Institute*

28. 10:00 Counseling with a Group of Mentally Retarded Children in the Public School Setting.
Cora Lynn C. Goldsborought; *Arlington County Schools*

29. 10:15 The Olfactory Sensitivity of the Rat to Some Homologous Hydrocarbons.

William R. Goff; *University of Virginia*

30. 10:30 Determining Aptitudes by Fiat.
Henry E. Garrett; *University of Virginia*

31. 10:45 Intermission

32. 11:00 Business Meeting: Virginia Psychological Association
Gilbert J. Rich, *President*
Cletus A. Cole, *Vice-President*
Cora Lynn C. Goldsborough, *Secretary*
Jacob Silverberg, *Treasurer*

## Section Of Science Teachers

Mae Jennings, *Chairman*

A. B. Niemeyer, Jr., *Chairman-Elect*

Virginia C. Ellett, *Secretary*

Caroline Gambrill, *Section Editor*

THURSDAY, MAY 7, 1959 — 1:00 P.M. — PEABODY 104

1:00 Teaching Materials. Booth 7.
*Demonstrators* A. B. Niemeyer, Jr.

1. 1:00 Setting and Maintaining Standards in Today's Schools.
Franklin D. Kizer; *Assistant Supervisor of Secondary Education*

2. 1:20 What the Virginia Junior Academy of Science has Meant to Me.
Joanna Hackman; *Hollins College*, and Robert Dunning

3. 1:30 Research and Techniques to Raise the Level of Instruction in Physics and General Science.
Edward North; *Washington and Lee High School*

4. 2:10 Recent Advances in Cytology.
Henry G. Kupfer; *Department of Clinical Pathology, Medical College of Virginia*

5. 2:50 The Role of the Virginia Department of Agriculture and Immigration in the Economic Growth and Development of Virginia.

Parke C. Brinkley; *Commissioner, Department of Agriculture and Immigration*

3:30 Audio-visual Laboratory, Cabell Hall
Visual Aids and Graphic Arts in Science and Mathematics Teaching.
Sponsored by Participants in the NSF Academic Year Institute.
Presented by Frank Moore and Ertle Thompson; *University of Virginia.*

## Section Of Statistics

J. W. Griswold, *Chairman*

Ira A. DeArmon, Jr., *Vice-Chairman*

R. J. Freund, *Secretary*

Clyde Y. Kramer, *Section Editor*

FRIDAY, MAY 8, 1959 — 9:00 A.M. — NEWCOMB HALL 4B

1. 9:00 Introductory Remarks by the Chairman
2. 9:10 Applications of Computers to Medical Research.
   Frank W. Banghart; *University of Virginia*
3. 9:30 Linear Programming Applications.
   N. L. Enrick and S. C. Lawrence; *Institute of Textile Technology*
4. 9:50 Aspects of Risk Programming.
   R. J. Freund and M. E. Rein; *Virginia Polytechnic Institute*

10:10 Intermission

5. 10:20 Traffic Volume Estimates; Probability Applications.
   Marvin Tummins; *Virginia Council of Highway Investigation and Research*
6. 10:40 A Method of Scheduling.
   M. F. Peck; *Virginia Polytechnic Institute*
7. 11:00 Notes of the Detection of Wearout.
   C. W. Clunies-Ross; *Virginia Polytechnic Institute*
8. 11:20 Some Problems of Inventory Control.
   R. L. Chaddha; *Virginia Polytechnic Institute*

9. 11:35 Statistical Theory and Economic Theory, a Comparison of Concepts of Decision Making.
D. Rutledge Vining; *University of Virginia*

10. 2:00 Path Analysis, Linear and Non-linear.
M. Turner; *Medical College of Virginia*

11. 2:45 Business Meeting

12. 3:15 A Comparison of Internal and External Assay Variation in Virulence Testing of Bacillus Anthracis Spores.
I. A. DeArmon, Jr.; *Fort Dietrick, Maryland*

13. 3:40 Graded vs. All-or-None Response in Bioassay.
F. M. Bradley; *Fort Dietrick, Maryland*

14. 4:00 Some Uses of Statistics in Plant Maintenance.
J. Armstrong; *DuPont, Richmond*

SATURDAY, MAY 9, 1959 – 9:00 A.M. – NEWCOMB HALL 4B

15. 9:00 Multivariate Sequential Procedures for Testing Means (Preliminary Report).
J. E. Jackson; *Virginia Polytechnic Institute*

16. 9:20 On Comparing Different Tests of the Same Hypothesis.
H. A. David; *Virginia Polytechnic Institute*

17. 9:40 A Study of Multivariate Confidence Bonds.
R. E. Bargmann; *Virginia Polytechnic Institute*

18. 10:00 Extremal Methods in Estimating Procedures.
D. C. Hurst; *Virginia Polytechnic Institute*

19. 10:20 Intermission

20. 10:30 Two-way Rank Sum Tests for Variances.
A. R. Ansari and R. A. Bradley; *Virginia Polytechnic Institute*

21. 11:10 A Comparison of the Effectiveness of Tournaments.
W. A. Glenn; *Virginia Polytechnic Institute*

22. 11:30 Factorials in Associated Incomplete Block Designs.
L. S. Brenna and C. Y. Kramer; *Virginia Polytechnic Institute*

[April

rison of

ation in

4B

s (Pre-

esis.

nstitute

nstitute